PSYCHOSOCIAL FACTORS AND ERGONOMIC ASSESSMENT FOR DEVELOPING AN EDUCATIONAL ERGONOMIC MODULE TO PREVENT MUSCULOSKELETAL DISORDERS AMONG MALAYSIAN TRAFFIC POLICE

By

NUR ZAFIRAH ATHIRAH BINTI ZAKARIA

Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfilment of the Requirements for the Degree of Master of Science

October 2024

FPSK(m) 2024 26

Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirement for the degree of Master of Science

PSYCHOSOCIAL FACTORS AND ERGONOMIC ASSESSMENT FOR DEVELOPING AN EDUCATIONAL ERGONOMIC MODULE TO PREVENT MUSCULOSKELETAL DISORDERS AMONG MALAYSIAN TRAFFIC POLICE

By

NUR ZAFIRAH ATHIRAH BINTI ZAKARIA

October 2024

Chairman : Associate Professor Karmegam a/l Karuppiah, PhD

Faculty : Medicine and Health Sciences

Traffic police officer deals with many kinds of risks such as health hazards while controlling traffic. They are required to stand the entire time they are on duty and are prone to stationary posture, which increases their chance of developing major musculoskeletal disorders. The chances increase as the factors contribute to declining mental health condition such as excessive demands on the job, limited control on the job, and poor social support are present. One of the methods to reduce the risk of developing Musculoskeletal Disorders (MSDs) is by enforcing a module in conjunction with the Occupational Safety and Health (OSH) regulations. Therefore, the aim of this study is to assess the psychosocial and ergonomics factors for the development of an Educational Ergonomic Module in the prevention of Musculoskeletal Disorders (MSD) among Malaysian Traffic Police. This study used a cross-sectional study design via surveys among Peninsular Malaysian Traffic Police. A total of 408 respondents randomly selected were needed to recruit in this study

considering not violating the exclusion criteria. The instruments involved throughout the study are questionnaire, and Rapid Entire Body Assessment (REBA). The questionnaire was modified from previous research and consists of five sections which are individual information, lifestyle information, occupational information, Nordic Musculoskeletal Questionnaires (NMQ), and Police Stress Questionnaire (PSQ). The questionnaire has a good reliability Cronbach's Alpha value ranging from 0.93 to 0.99. The result from this study revealed that out of 60.7% reported at least one pain in a body part, the highest prevalence reported is on the neck with 45.6% followed by the shoulder (43.2%) and the least reported body part is the elbow with 13.9% of respondents having the pain. Meanwhile, the prevalence of psychosocial factors reported a 50.3% of respondents indicates high stress for operational factors and 42.1% of high stress for organisational factors. From a logistic regression analysis, it was found that an operational and organisational factor are significant in association between the prevalence of MSDs with odds 1.330 and 1.378 respectively. However, other risk factors were found to be no associations with MSDs. This research further suggests that employers can consider revising and stipulating a plan to reduce the worker's susceptibility to having musculoskeletal disorders for a better quality of life in conjunction with the current legislations.

Keywords: ergonomics, awkward posture, psychosocial, MSDs, traffic police

SDG: GOAL 3: Good Health and Well-being, GOAL 8: Decent Work and Economic Growth

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk Ijazah Master Sains

FAKTOR PSIKOSOSIAL DAN PENILAIAN ERGONOMIK UNTUK MEMBANGUNKAN MODUL PENDIDIKAN ERGONOMIK BAGI MENCEGAH GANGGUAN MUSCULOSKELETAL (MSD) DALAM KALANGAN POLIS TRAFIK DI MALAYSIA

Oleh

NUR ZAFIRAH ATHIRAH BINTI ZAKARIA

Oktober 2024

Pengerusi : Profesor Madya Karmegam a/l Karuppiah, PhD

Fakulti : Perubatan dan Sains Kesihatan

Pegawai polis trafik terlibat secara langsung dalam pelbagai jenis risiko seperti hazard kesihatan sewaktu menjalankan tugasan pengawalan trafik. Tugasan mereka yang melibatkan keadaan posisi berdiri sepanjang masa bertugas dan kecenderungan kepada postur pegun boleh meningkatkan peluang mereka untuk mengalami masalah otot rangka. Keberangkalian ini bertambah jika faktor yang menyumbang kepada merudumnya kesihatan mental seseorang individu seperti permintaan yang berlebihan pada pekerjaan, kawalan terhad kepada pekerjaan, dan sokongan sosial yang lemah hadir. Salah satu kaedah yang boleh mengurangkan risiko untuk menghidapi masalah otot rangka adalah melalui penguatkuasaan satu modul yang bertunjangkan perundangan berkaitan kesihatan dan keselamatan pekerjaan sedia ada. Oleh yang demikian, tujuan kajian ini dijalankan adalah untuk menilai faktor psikososial dan faktor ergonomik bagi membangunkan modul ergonomik Pendidikan dalam pencegahan masalah otot rangka dalam kalangan polis trafik di Malaysia. Kajian ini

menggunapakai reka bentuk kajian keratan rentas melalui survei dalam kalangan polis trafik Semenanjung Malaysia. Seramai 408 responden dipilih secara rawak diperlukan untuk direkrut dalam kajian ini selagi mana tidak melanggar kriteria pengecualian. Instrumen yang terlibat sepanjang kajian ini dijalankan adalah borang soal selidik, dan Rapid Entire Body Assessment (REBA). Borang soal selidik telah diubahsuai daripada kajian sebelum ini dan mempunyai lima bahagian iaitu maklumat individu, maklumat gaya hidup, maklumat pekerjaan, Nordic Musculoskeletal Questionnaires (NMQ), dan Police Stress Questionnaire (PSQ). Borang soal selidik yang digunapakai mempunyai kebolehpercayaan yang baik dengan nilai Cronbach's Alpha antara 0.93 sehingga 0.99. Kajian ini mendapati bahawa daripada 60.7% melaporkan sekurang-kurangnya satu kesakitan pada bahagian badan, bahagian yang paling tinggi dilaporkan adalah pada leher dengan 45.6% diikuti oleh bahu (43.2%) dan bahagian badan yang paling kurang sakit ialah siku di mana sebanyak 13.9% responden yang melaporkan. Sementara itu, prevalens faktor psikososial melaporkan 50.3% responden menunjukkan tekanan tinggi untuk faktor operasi dan 42.1% tekanan tinggi untuk faktor organisasi. Daripada analisis regresi logistik, didapati bahawa faktor operasi dan organisasi adalah signifikan dalam hubungkait antara prevalens masalah otot rangka dengan kemungkinan 1.330 dan 1.378. Walaubagaimanapun, faktor risiko lain didapati tiada kaitan dengan masalah otot rangka. Cadangan daripada kajian ini untuk para majikan boleh mempertimbangkan bagi menyemak dan menetapkan rancangan untuk mengurangkan keberangkalian pekerja untuk mengalami masalah otot rangka demi kualiti kehidupan yang lebih baik sejajar dengan seruan perundangan-perundagan semasa.

Kata kunci: ergonomik, postur janggal, psikososial, MSDs, polis trafik

SDG: MATLAMAT 3: Kesihatan Yang Baik Dan Sejahtera, MATLAMAT 8: Pekerjaan Yang Baik Dan Pertumbuhan Ekonomi

ACKNOWLEDGEMENTS

In the name of Allah, the most Gracious and the Most Merciful, all praises to Allah SWT for His blessings and for the strength given to complete this thesis. First and foremost, I'd like to use this opportunity to convey my gratitude to my supervisors, Assoc. Prof. Dr. Karmegam Karuppiah, Assoc. Prof. Dr. Irniza Binti Rasdi, and Dr. Murugadas Ramdas for their tremendous patience, guidance, motivations and immense knowledge. Their advice and comments on a variety of topics encountered during this thesis journey were really helpful to me during the research process and thesis writing.

Secondly, I owe it to my classmates, friends, and the people in my life who always look out for my inner and outer health by providing endless motivation and encouragement in completing this thesis.

Lastly, I would love to express my sincere appreciation to my parents for their endless love, support and work of encouragement during my ups and downs. It would be hard for me to face the obstacles and keep my motivation during this journey without their support. May Allah bless and reward them.

Honorary mention as this work was supported by the Ministry of Education Malaysia (MOE) Fundamental Research Grant Scheme [grant number Ref: FRGS/1/2022/SKK06/ UPM/02/2]; and Special Graduate Research Allowance Scheme (SGRA) of Universiti Putra Malaysia (UPM) FRGS/1/2022/SKK06/UPM/02/2].

The thesis was submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfilment of the requirement for the degree of Master of Science. The members of the Supervisory Committee were as follows:

Karmegam a/l Karuppiah, PhD
Associate Professor
Faculty of Medicine and Health Sciences
Universiti Putra Malaysia
(Chairman)

Irniza binti Rasdi, PhD
Associate Professor
Faculty of Medicine and Health Sciences
Universiti Putra Malaysia
(Member)

Murugadas a/l Ramdas @ Chelamuthu, PhD
Senior Lecturer
Commerce Department
Politeknik Sultan Salahuddin Abdul Aziz Shah
(Member)

ZALILAH MOHD SHARIFF, PhD
Professor and Dean
School of Graduate Studies
Universiti Putra Malaysia

Date: 24 February 2025

TABLE OF CONTENTS

		Page
ABSTRACT		i
ABSTRAK		iii
ACKNOWLEDGEMENTS		vi
APPROVAL		vii
DECLARATION		ix
LIST OF TABLES		xiii
LIST OF FIGURES		xiv
LIST OF ABBREVIATIONS		xv
CHAPTER		
1	**INTRODUCTION**	1
	1.1 Background	1
	1.2 Problem Statement	4
	1.3 Significance of Study	7
	1.4 Research Questions	9
	1.5 Objectives	10
	1.5.1 General Objectives	10
	1.5.2 Specific Objectives	10
	1.6 Research Hypothesis	11
	1.7 Conceptual Definition	11
2	**LITERATURE REVIEW**	13
	2.1 Police Officers in Malaysia	13
	2.2 Psychosocial Hazards Related Studies Among Police Officers	16
	2.3 Ergonomics Hazards Related Studies Among Police Officers	19
	2.4 Rapid Entire Body Assessment (REBA)	20
	2.5 Occupational Safety and Health (OSH) In Malaysia	23
	2.6 Occupational Safety and Health (OSH) Module and Training	24
	2.7 Conceptual Framework	30
3	**METHODOLOGY**	32
	3.1 Study Location	32
	3.2 Study Design	32
	3.3 Study Duration	32
	3.4 Sampling	33
	3.4.1 Study Population	33
	3.4.2 Sampling Population, Sampling Frame and Sampling Unit	33
	3.4.3 Selection Criteria	33
	3.4.4 Sampling Technique (Method)	34
	3.4.5 Sampling Size	34
	3.5 Instrument	35

	3.5.1	Rapid Entire Body Assessment (REBA)	35
	3.5.2	Questionnaire	36
3.6		Validity and Reliability of Instrument	39
	3.6.1	Rapid Entire Body Assessment (REBA)	39
	3.6.2	Nordic Musculoskeletal Questionnaire (NMQ)	40
	3.6.3	Police Stress Questionnaire (PSQ)	40
3.7		Data Collection Technique	40
	3.7.1	Development of Educational Ergonomics Module for Malaysian Traffic Police Officers	41
	3.7.2	Variables and Operational Definitions	42
3.8		Data Analysis	42
3.9		Ethical Consideration	43
	3.9.1	Subject Vulnerability	43
	3.9.2	Measures Taken	43
	3.9.3	Identify Vulnerable Groups	44
3.10		Honorarium and Incentives to Respondents	44
3.11		Study Flowchart	45
4	**RESULTS**		46
4.1		Prevalence of MSDs And Psychosocial Factors	46
4.2		Potential Awkward Posture	51
4.3		Association Between REBA Score and Risk Factors (Sociodemographic Characteristics, Lifestyle, And Occupational Factors)	53
4.4		Association Between REBA Score and Self-Reported (Musculoskeletal Disorders and Psychosocial Factors)	61
5	**DISCUSSION**		63
5.1		Prevalence of MSDs And Psychosocial Factors	63
5.2		Potential Awkward Posture	73
5.3		Association Between REBA Score and Risk Factors (Sociodemographic Characteristics, Lifestyle, And Occupational Factors)	78
5.4		Association Between REBA Score and Self-Reported (Musculoskeletal Disorders and Psychosocial Factors)	82
5.5		Developing Ergonomic Module	85
6	**CONCLUSION AND RECOMMENDATION**		88
6.1		Conclusion	88
6.2		Limitation	89
6.3		Recommendations	90
REFERENCES			92
APPENDICES			117
BIODATA OF STUDENT			142
LIST OF PUBLICATION			143

LIST OF TABLES

Table		Page
4.1	Prevalence of Musculoskeletal Disorders (MSDs) based on body parts among Malaysian traffic police	46
4.2	Prevalence of psychosocial stress among Malaysian traffic police	47
4.3	Prevalence of psychosocial stress by stressors two main category among Malaysian traffic police	48
4.4	Mean of psychosocial factors based on specific category among Malaysian traffic police	48
4.5	Mean of psychosocial stressors for each factor among Malaysian traffic police	49
4.6	Prevalence of awkward posture among Malaysian traffic police	51
4.7	Prevalence of risk category based on REBA among Malaysian traffic police	51
4.8	Detailed prevalence of awkward posture based on each work task observed among Malaysian traffic police	52
4.9	Association between REBA score and risk factors present among Malaysian traffic police (N=32)	53
4.10	Correlation of REBA scores and risk factors present among Malaysian traffic police (N=32)	57
4.11	Association between Musculoskeletal disorders (MSDs) and risk factors among Malaysian traffic police (N=366)	58
4.12	Association between REBA score with MSDs and psychosocial factors in categorical value among Malaysian traffic police (N=32)	61
4.13	Association between presence of MSDs and psychosocial factors among Malaysian traffic police (N=32)	61
4.14	Association between psychosocial stressors and the presence of MSDs among Malaysian traffic police (N=366)	62

LIST OF FIGURES

Figure		Page
1	Current research conceptual framework	31
2	The REBA tool for employee assessment worksheet	36
3	Current research flowchart	45
4	An example of measuring REBA angle of an officer performing traffic control duty	53

LIST OF ABBREVIATIONS

UPM	Universiti Putra Malaysia
MSDs	Musculoskeletal Disorders
REBA	Rapid Entire Body Assessment
NMQ	Nordic Musculoskeletal Questionnaires
PSQ	Police Stress Questionnaire
RULA	Rapid Upper Limb Assessment
OSH	Occupational Safety And Health
WRMSDs/WMSD	Work-Related Musculoskeletal Disorder
LBP	Low Back Pain
WHO	World Health Organization
RMP	Royal Malaysia Police
OSHA	Occupational Safety And Health Act 1994
SDG	Sustainable Development Goals
DOSH	Department Of Occupational Safety And Health
PTSD	Post-Traumatic Stress Disorder
HAV	Hand-Arm Vibration
NCOSH	National Council For Occupational Safety And Health
NIOSH	National Institute Of Occupational Safety And Health
IPD	Ibu Pejabat Polis Daerah
PSQ-OP	Police Stress Questionnaire Operational
PSQ-ORG	Police Stress Questionnaire Organisational
IRR	Inter-Rater Reliability
JKEUPM	Ethics Committee For Research Involving Human Subjects
BMP	Bone Morphogenetic Proteins

BMPCs	Bone Marrow Progenitor Cells
WBV	Whole Body Vibration
ACTH	Adrenocorticotropic Hormone
BAKA	Bahagian Agama Dan Kaunseling
SPSS	Statistical Package For The Social Science

CHAPTER 1

INTRODUCTION

1.1 Background

Police officers in Malaysia are referred to as any members of the Royal Malaysian Police and the primary agent in charge of preserving public order (Police Act, 1967). According to the Royal Malaysian Police official website, as of 2013 in Malaysia, there were 4,760 police officers in the Traffic Branch out of 102,037 total of police officers (The Official Portal of Royal Malaysia Police, 2022). Police officers in the Traffic Branch are commonly called as traffic police officers. The Traffic Branch's known duty is "to regulate, control and divert any traffic, to keep order on public roads, streets, thoroughfares and landing places, and at other places of public resort and places to which the public have access, and to prevent obstruction on the occasions of assemblies and processions" (The Official Portal of Royal Malaysia Police, 2022).

Due to the growing number of motor vehicles, many cities such as Kuala Lumpur and Johor Bahru have experienced traffic congestion, making the traffic police officer's job difficult and complex (Ministry of Transportation Malaysia, 2023). It is irrefutable as their nature of work, traffic police officer deals with many kinds of risks such as health hazards while controlling traffic, including biological risks, physical risks, ergonomic risks, chemical risks, and psychological stress (Jamil et al., 2021; Paudel et al., 2018). Additionally, traffic police officers are required to stand the entire time they are on duty and are prone to stationary posture, which increases their chance of developing major musculoskeletal disorders (Karmegam, 2023; Waters & Dick, 2015). By looking at their demanding nature of their jobs, extended work hours, and

traffic jams which are all factors that contribute to psychological stress suffered among traffic police officers (Omar et al., 2020; Jamil et al., 2020).

Musculoskeletal disorders (MSDs) is among the most prevalent work-related health concerns among all occupational hazards (World Health Organization, 2022). MSDs or in the context of occupational setting commonly called work-related musculoskeletal disorder (WRMSDs) is defined as "A wide range of inflammatory and degenerative disease conditions that result in pain and functional impairment affecting the neck, shoulders, elbows, wrists, and hands" (Vijay, 2013; Soares et al., 2020). The number of years worked, the length of working period, the awkward and static postures, the repetitive motions, the unpleasant position, vibration, manual handling, and other factors have all been linked to a high reported prevalence of WRMSDs among traffic police officers. This causes stress on the joints and several musculoskeletal problems, which are the main reasons why individuals skip work (Dey et al, 2023; Carayon et al., 1999). In fact, standing for a prolonged period can cause MSDs because the hip and waist regions are often where the centre of gravity is located when standing hence the hips support the majority of the body weight and may wear out the hip-supporting muscles (Phadke et al., 2015; Jo et al., 2021).

The concern further rises when low back pain (LBP) is the highest prevalent health issue among WRMSDs worldwide (Prasoon & Subramanian, 2023; Choobineh et al., 2007). It is also a significant contributor to workplace disabilities. The World Health Organization (WHO) released a report citing low back pain as the reason for missed work and doctor visits (World Health Organization, 2023). In their lifetime, between 70% and 80% of people worldwide will have low back pain at least once (Agebure et al., 2023; Charoenchai et al., 2006). LBP is primarily driven by a lack of awareness of

good posture and is a driver to chronic occupational disability, decreased productivity, and medical leave absenteeism (Feitosa et al., 2020; Cramer et al., 2018).

The Job Demand-Control-Support model theory implied the primary causes of workers' declining mental health condition are excessive demands on the job, limited control on the job, and poor social support in the workforce. Numerous policing research supported this hypothesis (Ellison & Caudill, 2020; Smoktunowicz et al., 2015; Houdmont et al., 2012; Johnson et al., 1989). Several organisational job stresses in police work, such as workload, decision latitude, organisational support, and staff shortage, have been repeatedly discovered to be relevant in forecasting mental well-being (Cheung & Li, 2023; Humayon et al., 2018; Padyab et al., 2016; Tyagi & Dhar, 2014; Summerlin et al., 2010). Staff shortages, a lack of equipment to perform duties, leaders that overemphasised the negative, policy and legislative changes, and a lack of resources were the top five psychosocial stresses related to police work that were reported (McCreary & Thompson, 2006). The findings indicate that respondents who worked in urban areas had much greater levels of job pressure, family-work issues, and unclear role than those who worked in suburban areas. Numerous psychosocial job variables were shown to be consistently relevant in predicting police officers' mental health.

Over the years, the influence of ergonomic factors in the workforce related to developing the risk of musculoskeletal disorders (MSDs) has garnered attention and discussion globally. Traffic police officers are working in a risky workforce in Malaysia by exposing to multiple occupational hazards (Jamil et al., 2021). To complete their tasks, they must expose to stress, heavy workload, standing for a long time, repeated movement, and awkward posture. Nonetheless, there are insufficient

studies associated with psychosocial factors and ergonomics hazards among Malaysian traffic police officers which can cause the risk of developing MSDs.

1.2 Problem Statement

The findings from Global Burden of Disease (GBD) 2021 data reported that low back pain was affecting 619 million people globally and it is the highest contributor to years lived with disability (YLDs) worldwide where 69.0 million YLDs were recorded which accounts for 8.1% of all YLDs worldwide and followed by depressive disorders with 56.3 million YLDs (Ferreira et al., 2023; Ferrari et al., 2024). In fact, the low back pain cases in 2050 were estimated to be increasing with 843 million individuals will be affected globally (Ferreira et al., 2023). Meanwhile, the latest report from the Department of Occupational Safety and Health (DOSH) has recorded an increasing case of MSDs among the workers between 2021 and 2022 with 201 and 269 cases respectively (Department of Occupational Safety and Health, 2022). Likewise, depression among individuals in Malaysia was found to be increased by doubled from 2019 to 2023 based on the National Health and Morbidity Survey 2023 (Institute for Public Health, 2023).

In 2019, the Royal Malaysia Police (RMP), is a part of Malaysia's security forces organisation, had 113,426 officers and personnel. This organisation is centralised, with functions ranging from traffic control to information collecting (The Official Portal of Royal Malaysia Police, 2019). One of the primary divisions of the Royal Malaysia Police (RMP) is the Department of Investigation and Traffic Enforcement, which oversees the traffic police force in Malaysia. In this department, traffic police riders embody one of the most important subdivisions. Throughout their eight to 12 hours of

working shifts, they are in charge of fining any road users who broke the law, patrolling selected locations, and escorting (Jamil et al., 2021).

The Malaysian Occupational Safety and Health Act 1994 (OSHA) indeed applies to the Royal Malaysia Police as well. According to Section 15, OSHA, "it shall be the duty of every employer and every self-employed person to ensure, to the greatest extent practicable, the safety, health, and welfare at work of all his employees." As a result, all necessary precautions must be utilized concerning traffic officers' safety, health, and welfare (Occupational Safety and Health Act, 1994). However, the implementation of this law and Occupational Safety and Health (OSH) module among the police in Malaysia is very lacking compared to developed countries that already have OSH guidelines for police officers such as A Guide to Occupational Health and Safety for Law Enforcement Executives in the United States and Canada (Sanberg et al., 2010).

Moreover, no researches related to the OSH module, especially on ergonomics have been conducted among Malaysian traffic police officers. The module holds the purpose to eliminate and control the ergonomics hazard exposed upon the workers. The pattern of early retirement among Malaysian police officers is concerning in light of the workload, stress, and health issues (Halid et al., 2024; Berita Harian, 2018). In between the year of 2016 and 2020, 59.42% out of 16132 police officers whom retired are classified as premature retirement (Francis et al., 2022). Hence, the place of work is among the most vital environments for employees (Zhenjing et al., 2022). One of the difficult aspects of working as a police officer is the dangerous and stressful work environment. Given that police officers frequently work different hours, alternate within servicing the public and enforcing the law, keep watchful on every second, and

continuously confront risk to safeguard the safety of everyone else, police work may be more stressful and hazardous than other jobs.

The topic of ergonomic factors in the work environments in developing the risk of MSDs are being concerned globally. Based on a previous study in 2019, it turned out that 88.3% of Malaysian traffic police riders developed MSDs, where 34.3% of the riders experiencing pain on the lower back triggered by sitting for a long period and static posture when using the motorbike (Ahmad et al., 2023; Diyana et al., 2019). Other studies additionally found that 54.7% of the traffic police officers ridden high-powered motorbikes averaging around 5.64 hours per day which involved static posture without lumbar support resulting in worsening pain which increased fatigue in the muscles (Yusof, 2016, Jamil et al., 2021). This showed that traffic police officers dealt with numerous kinds of ergonomics hazards, and their lack of power over the dangers aggravated their situation (Jamil et al., 2021; Diyana et al., 2019).

There are several studies found a direct relationship between the high prevalence of musculoskeletal disorders with psychosocial factors (job content, job demand, and social support) and ergonomic factors (awkward posture, manual lifting, repetitive, and prolonged standing) among workers (Anwer et al., 2021; Rahman et al., 2017; Habibi et al., 2012). However, very scarce research available on psychosocial and ergonomics problems among Malaysian traffic police officers. Hence, it is crucial to tackle these risks among Malaysian traffic police officers to improve and sustain their health. Therefore, the development of an educational ergonomics module will be a focus of this research as one promising strategy for avoiding musculoskeletal disorders forming in the workforce.

This research is in adherence to the execution of the Occupational Safety and Health Master Plan (OSHMP 2021-2025) where the empowerment of OSH in the public sector (Strategy 1), strengthening the practice of self-regulation in the workplace (strategy 2), the promotion of OSH research education in the workplace (strategy 3) and the empowerment of Occupational Health (strategy 4). Besides that, in conjunction with the Sustainable Development Goals (SDG) where the goal of Sustainable Development Goals (SDG 3): Good Health and Well-being for the Royal Malaysia Police will be addressed by this study, which will evaluate the most common and highest risk of ergonomics hazards at their workplace and provide a thorough control mechanism via the development of an educational ergonomics module customised to their job task and working environment.

1.3 Significance of Study

In order to end poverty, safeguard the environment, and guarantee that everyone lives in peace and prosperity by 2030, the United Nations Member States established the Sustainable Development Goals (SDGs), commonly referred to as the Global Goals, in 2015. The 17 Sustainable Development Goals (SDGs) have been incorporated in that they acknowledge the decisions made in one area will have an impact on other areas and that development must balance the sustainability of environmental, economic, and social. The goal of SDG 3: Good Health and Well-being for the Royal Malaysia Police will be addressed by this study, which will evaluate the most common and highest risk of ergonomics at their workplace and provide a thorough control mechanism via the development of an Educational Ergonomics Module customised to their job task and working environment (UNDESA, 2021).

This study will positively impact many parties involved in creating the educational ergonomics module, which will help save government costs in the future especially involving psychosocial and MSD treatment by producing better health and safety management with responsible resource management. Besides that, the variables in this study, which prevail in all situations, refer to the fulfilment of all regulatory, health, and safety environment requirements.

This study will also act as a platform for collaboration and benefit many parties, including Royal Malaysian Police, universities, and statutory authorities, in the continuous delivery of knowledge to produce a well-versed society in sustainable knowledge. It is also in line with the Occupational Safety and Health Act 1994 (OSHA), that was introduced to preserve the safety, health, and welfare of all individuals across all workplace.

The study has the potential to propose a customized Ergonomic Module specific to the Royal Malaysian Police (traffic police officers) work task by conducting the ergonomics hazard identification and eventually improving the organisation policies in the prevention of occupational injuries among their officers. Therefore, the baseline data from the assessments will be beneficial and useful for the relevant bodies in pursuing the health and safety of the Royal Malaysia Police per the Occupational Safety and Health Act 1994.

Besides that, the data discovered in this study which encompasses the sociodemographic, lifestyle information, occupational background, and prevalence of MSDs will be discussed by the experts involved in this study (officer-in-charge

(police), health and safety personnel, ergonomists, and research expert) then the recommendation and guidance will be suggested for developing an educational ergonomic module in preventing MSDs within traffic police in Malaysia in which some of the factors discovered as significant in this study will be considered and included in the module, together with the references from the Malaysian Department of Occupational Safety and Health (DOSH) guidelines.

Therefore, this study will evaluate the psychosocial factors and ergonomics for the development of an Educational Ergonomic Module in the prevention of Musculoskeletal Disorders (MSDs) among Malaysian Traffic Police. This study will fill the research gap and provide data on MSDs and the psychosocial level of Malaysian traffic police officers. Besides, it will also be able to give a clear picture of ergonomics hazards faced by Malaysian traffic police officers while working and create opportunities towards the implementation of OSH in Malaysia among the traffic police officers.

1.4 Research Questions

1. What is the prevalence of self-reported data (musculoskeletal disorders, and psychosocial factors) among traffic police officers in Malaysia?
2. What are the possible ergonomics hazards problems faced by Malaysian traffic police officers?
3. Is there any significant association between REBA score with self-reported (musculoskeletal disorders and psychosocial factors) among Malaysian traffic police officers?

4. Is there any significant association between REBA score and risk factors (sociodemographic characteristics, lifestyle, and occupational factors) among Malaysian traffic police officers?

5. What are the factors that need to be considered to propose an educational ergonomics training module for Malaysian traffic police officers?

1.5 Objectives

1.5.1 General Objectives

To assess the psychosocial and ergonomics factors for the development of an Educational Ergonomic Module in the prevention of Musculoskeletal Disorders (MSD) among Malaysian Traffic Police

1.5.2 Specific Objectives

In order to measure the ergonomics, two variables were used; REBA score (which measures awkward posture that eventually leads to musculoskeletal disorders) and musculoskeletal disorders prevalence (the body parts having pain and measured by using NMQ tool). Accordingly, the specific objectives for this study are outlined as below:

1. To determine the prevalence of self-reported (musculoskeletal disorders and psychosocial factors) among Malaysian Traffic Police Officers.

2. To identify the potential awkward posture as ergonomics hazard that may cause harm to Malaysian traffic police officers

3. To determine the association between REBA score and risk factors (sociodemographic characteristics, lifestyle, and occupational factors) among Malaysian traffic police officers.

4. To determine the association between REBA score and self-reported (musculoskeletal disorders and psychosocial factors) among Malaysian traffic police officers.

5. To propose an educational ergonomics training module for Malaysian traffic police officers.

1.6 Research Hypothesis

There is a significant association between psychosocial factors and ergonomics factors with the developing risk of Musculoskeletal Disorders (MSD) among Malaysian Traffic Police.

1.7 Conceptual Definition

Psychosocial factors are traits or aspects that impact an individual social and/or psychological well-being. According to Thomas et al. (2020), these variables can characterize individuals concerning their social surroundings and how they affect them physically and mentally. Social factors encompass broad elements at the foundation of human interaction related to social processes and social structure that affecting on the person. Meanwhile, individual-level meanings and processes that affect mental conditions are examples of psychological factors (Witten et al., 2020; Upton, 2013).

Ergonomics risk factors are any trait, attribute or exposure which may lead to or exacerbate an injury to the musculoskeletal system however, a risk factor by itself may not cause an injury. Generally, the presence of multiple risk factors simultaneously raises the likelihood of injuries (Department of Occupational Safety and Health, 2017).

Musculoskeletal disorders (MSDs) are defined as conditions or injuries affecting the muscles, tendons, nerves, joints, spinal discs, and cartilage. The Bureau of Labor Statistics of the Department of Labor further describes MSDs as disorders and diseases of the connective tissue and musculoskeletal system when the occurrence or exposure that caused the case was a body reaction such as bending, twisting, and reaching, repetitive motion, or overexertion (Centers for Disease Control and Prevention, 2020).

Traffic police officers are defined as police officers under the division of Department of Investigation and Traffic Enforcement in the Royal Malaysia Police (RMP) (The Official Portal of Royal Malaysia Police, 2022). They are responsible in enforcing the traffic laws as well as controlling the traffic in Malaysia.

CHAPTER 2

LITERATURE REVIEW

2.1 Police Officers in Malaysia

In 2019, the Royal Malaysia Police (RMP), that is part of Malaysia's security forces organisation, had 113,426 officers and personnel. This organisation is centralised, with functions ranging from traffic control to information collecting (The Official Portal of Royal Malaysia Police, 2019). A team of Extra Police Constables, Police Cadets, Auxiliary Police, Police Volunteer Reserves, and civilian services also assisted the RMP in carrying out their duties (Ismail et al., 2023; Aseanapol, 2013). These organisations play a vital part in determining and controlling the country's safety and well-being. The Department of Management, Department of Strategic Resources and Technology, Department of Criminal Investigation, Department of Home Affairs Security and Public Order, Narcotics Department, Commercial Crime Investigation Department, Special Branch, Department of Crime Prevention and Community Safety, and Department of Integrity and Compliance Standards comprise the nine main departments that make up RMP (The Official Portal of Royal Malaysia Police, 2022b). The four levels of RMP structure comprises of Federal level, Contingent level (where it is located in each state), District Police Offices, and Police Stations. The District Police Offices level, that is the primary aim of this particular study, is comprised of general police and specific departments or work tasks.

According to Police Act 1967 Section 20, the responsibilities of the Royal Malaysia Police personnel are as follows: “Apprehending all persons whom he is by law authorised to apprehend; Processing security intelligence; Conducting prosecutions;

Giving assistance in the carrying out of any law relating to revenue, excise, sanitation, quarantine, immigration and registration; Giving assistance in the preservation of order in the ports, harbours and airports of Malaysia, and in enforcing maritime and port regulations; Executing summonses, subpoenas, warrants, commitments and other process lawfully issued by any competent authority; Exhibiting information; Protecting unclaimed and lost property and finding the owners thereof; Seizing stray animals and placing them in a public pound; Giving assistance in the protection of life and property; Protecting public property from loss or injury; Attending the criminal courts and, if specially ordered, the civil courts, and keeping order therein; and Escorting and guarding prisoners and other persons in the custody of the police" (Police Act, 1967).

The hazardous and demanding work environment is one of the challenging elements of being a police officer. Police officers frequently deal with a variety of social and natural disasters, such as mass accidents and natural disasters, in addition to being exposed to traumatic events like physical threats and violence while on duty (Violanti et al., 2017b; Han & Yoon, 2024). Consequently, police officers are more likely to develop post-traumatic stress disorder (PTSD) as a result of their unpredictable, round-the-clock work environment, which exposes them to physical threats as well as psychological instability like anxiety and dissociation (Wagner et al., 2020). For instance, traffic police officers have particular duties in which they are regularly outside, where they are subjected to air pollution and vehicle noise. They must spend an extensive amount of time on the road to control traffic in areas where roads are constantly congested, like those in Malaysia, India, and Thailand have experienced (Jamil et al., 2020; Rasdi, 2018). According to Rasdi et al. (2020), traffic police officers, especially those who control traffic movements in a crowded city like Kuala

Lumpur, are subjected to numerous environmental hazards that may contribute to their fatigue. As traffic police officers, their duties extend beyond managing congested junctions; they also have to mobilize around the city to patrol and fine those who violate traffic safety laws and regulations (Rasdi et al., 2020). Given the workload, stress, and health concerns, Malaysian police officers' early retirement trend is alarming (Halid et al., 2024; Berita Harian, 2018). It was found that 59.42% of the 16132 retired police officers between 2016 and 2020 were categorized as having retired too soon (Francis et al., 2022). Hence, the workplace is one of the most important places for workers (Zhenjing et al., 2022; Yusof, 2016).

As expected, during recruitment, police underwent rigorous training by which they attained a high physical fitness level. For the sake of security and control of society, it is a must for their occupation to be physically fit. The physical status needs to be maintained throughout their profession. It is clear from the assigned duty that urban traffic police had a greater workload than their rural counterparts (Wu & Wen, 2020; Rasdi, 2018). In addition to other duties including patrolling, filing reports, and dealing with traffic violators, Kuala Lumpur's traffic police must remain on the road for about eight hours every day in order to manage high traffic volumes. Accordingly, rural traffic police officers are only required to be on the road during major events that are planned in small rural towns and involve a sizable number of people and cars aside from inspecting and patrolling for traffic violations (Wu & Wen, 2020; Rasdi, 2018). Unlike Kuala Lumpur, which has 500 traffic police officers, rural areas have a significantly smaller traffic branch with no more than 20 policemen each district (Rasdi, 2018). However, some previous studies have reported on some of the stressors of life faced by police officers due to poor interpersonal relationships, prolonged standing at work for most of their working hours, insufficient personal time; a 10 to

12-hour daily shift schedule that disrupts normal sleep patterns and social life (Krick & Felfe, 2020). Therefore, it is crucial to acknowledge the psychosocial factors and WMSDs among these police to improve their health.

2.2 Psychosocial Hazards Related Studies Among Police Officers

The World Health Organization (WHO), estimates the person suffering from chronic mental illnesses will die a decade earlier than normally healthy person (World Health Organization, 2021). Approximately 970 million humans worldwide suffer from mental illnesses, resulting as one of the main contributors of disability and illness. The five most prevalent mental health issues in the Asia Pacific (including Malaysia) are post-traumatic stress disorder (PTSD), substance abuse disorders, suicidal behaviour, anxiety, and depression in accordance to a 2012 report released by the Organisation for Economic Cooperation and Development of WHO (Rasdi, 2018; Cyr, M-P, 2010).

As seen by research, working as a Malaysian police is correlated with an elevated level of stress (Mamat et al., 2022; Rasdi, 2018). Given that police officers frequently work different hours, alternate within enforcing the law and servicing the public, stay watchful throughout the occasions, and continuously confront risk to safeguard the lives of the people, police work may be more stressful than other jobs.

Weak designs in task and job, weak interpersonal connections and communication, harassment, hostility at workplace, and exhaustion are all examples of organisational and personal variables that can affect workplace psychological health. These risks ought to be viewed in similar light as other risks to one's health and safety, and an

organisation's safety and health policy ought to include a dedication in preventing stress at work (Australian Government Comcare, 2020).

As the public's first line of defence for the RMP, the traffic police in the Point Duty Unit have extremely job demands. Based on a 2015 study, there seems to be a significant risk of mental health problems among Malaysian police officers due to a variety of work-related stressors (Mamat et al., 2022; Irniza & Saliluddin, 2015). The contributor for psychological distress identified includes staff shortages, inadequate resources, frequent changes in legislation or policy, lack of equipment, and leadership excessively emphasizes the negatives such as public complaints or supervisor evaluation (Mamat et al., 2022; Rasdi, 2018).

The police officers work environment is risky and taxing, and considered as one of the prime issues in police profession. Around 75% of police officers in New Zealand identified to be suffering a minimum of one traumatizing incident, and nearly half of the study samples had been assaulted physically within a year after enlistment (Violanti et al., 2016). About 1,993 police officers in Finland identified a significant correlation between their mental health and well-being with critical incidents (Leung et al., 2012). Meanwhile, there was an odd ratio of 1.62 in distress for 'threats or assaults with a deadly weapon' and a 1.67 odds ratio for 'physically violent acts' (Leino et al., 2011). Similarly, among 202 Brazilian police officers, a correlation was discovered concerning traumatic symptoms and critical incident exposure (Maia et al., 2011).

Furthermore, police officers may experience stress due to a variety of factors which includes their impression of the public's support, society's negative reaction on them,

and traumatic experience from the incidents (Mamat et al., 2022; Violanti et al., 2017b). According to research on police death rates, a greater percentage of police officers compared to the rest of the population suffer diseases brought on by stress (Lee et al., 2022; Violanti, 2010). While police stress has been the subject of various research, only several have addressed police officer's work-related psychological well-being.

As seen among Quebec police officers, low back pain is associated with factors including job satisfaction and frequent post-traumatic treatments (psychological help) following a difficult situation at work (Douma et al., 2019). This occurs as a result of police officers' work schedules that need overtime, which prevents them from getting enough sleep in between shifts (Granholm Valmari et al., 2022; Ramstrand & Larsen, 2012). Additionally, police officers' MSDs may also be associated with a lack of social support and insufficient control over their work (Rabbing et al., 2022; Larsen et al., 2019). According to Kisi and Kayastha (2024) workers may experience fatigue at work as a result of stress, and stress is a consequence of exhausted labor. Meanwhile, other studies have shown that prolonged lengths of time spent working in an awkward and static position can cause pain, discomfort, and chronic fatigue (Jo et al., 2021; McNee et al., 2013). A further indication of the physical impact of police work is the correlation between musculoskeletal problems and specific occupational characteristics, such as shift work and prolonged sitting postures (Pandey & Bindra, 2023). Referring to a systematic review from Buruck et al. (2019), there is a lack of studies concerning psychosocial factors and low back pain or MSDs in Malaysia especially among traffic police officers.

2.3 Ergonomics Hazards Related Studies Among Police Officers

In accordance to SafetyLine Lone Worker (2016), ergonomic hazards vary in severity depending on the extent of exposure over a period of time and strain injuries on one's physique tend to not usually apparent instantly. The risk of these hazards may lead to a variety of injuries, ranging between muscle sore and chronic conditions. Generally, among the police working in the office, the ergonomic hazards mainly are related between prolonged period to chronic conditions (Jamil et al., 2021; Mona et al., 2019). Moreover, the hazards also mainly caused by long periods of utilizing the computer and for the specific department, the ergonomic hazards may arise from the overuse of joints and prolonged handling of motorcycles on duties. Since police officers must be on duty for a lengthy shift, they tend to have high musculoskeletal strains (Jamil et al., 2021; Yusof, 2016). Because of the demands from work, there is a high chance for some of them having extended rides and awkward postures. These elements then serve as the foundations from which they report on Work-Related Musculoskeletal Disorder (WMSDs).

Aside from that, almost all of the motorbikes utilized are high-powered and old. Due to the high-powered motorbikes' about 210kg in weight, using them requires exertion force of labour (Jamil et al., 2021; Yusof, 2016). Subsequently, standing for a prolonged period of time is seen an issue as throughout their duty, they require to stand for hours long. The shoulder, neck, and lower back were discovered to be the prevalent WMSDs within 67.9% of traffic police riders in a 2019 research conducted (Diyana et al., 2019). Other than that, the same study found riding time, hand-arm vibration (HAV), and period of service are the WMSDs prominent risk factors among Royal Malaysian Police riders. Based on the prior research that emphasizes on police riders

and high-powered motorbikes are incompatible in the aspect of ergonomic interaction (Jamil et al., 2021; Yusof, 2016).

According to a study in Roman, the seats in patrol cars for operative police officers and prolonged period ahead of the computer sitting on visitor-style seats for non-operative police officers are the utmost prevalent risk of ergonomic (Hsiao, 2023; Achim, 2014). However, there is a lack of WMSD reporting in Malaysia among the RMP across their specific departments and work tasks. This is significant since police work tasks vary greatly between countries and states, as well as between departments (Wu & Wen, 2020; Rasdi, 2018). There has been limited research on the WMSD and its variables undertaken by the Royal Malaysian Police throughout their specific departments and work tasks. Nonetheless, as we can see, there are significant chances of prolonged riding and awkward postures between them due to the work demand.

These officers faced an array of dangers, and their lack of control over the dangers aggravated their situation (Jamil et al., 2021). Hence, it is crucial to tackle these factors among the Royal Malaysian Police to improve their health.

2.4 Rapid Entire Body Assessment (REBA)

The approaches taken to assess disorders related musculoskeletal vary based upon the country, the firms that provide the evaluations, and the workplace, out of a variety of variables. Therefore, these approaches are further categorized as indirect, semi-direct, or direct methods (Boyd, 2021; Gómez-Galán et al., 2017). The use of direct methods needs the fastening of electronic devices to the worker's body for real-time assessment.

Hignett and McAtamney from Nottingham Hospital in the United Kingdom created Rapid Entire Body Assessment (REBA), which was first published in 2000 (Hita-Gutiérrez et al., 2020). It is an effort from the work of collaboration by groups of nurses, physiotherapists, and ergonomists that evaluated and discovered more than 600 distinct postures when performing work. By using REBA, it lets the user to assess the positions of the subject's lower extremities, neck, trunk, and upper limbs together at the same time. The instrument also differentiates between the types of grips and activity of muscles utilized. It differentiates five degrees of danger, between extremely low to very high (Boyd, 2021; Hignett & McAtamney, 2000).

The following are the primary benefits of the REBA approach (Hita-Gutiérrez et al., 2021; Cuixart, 2001):

a. The cost-benefit ratio is favourable.

b. It is simple to implement. Data collecting can be done with just a pen and paper, but there are computer apps that can help speed up or simplify the process.

c. The individual score acquired after examining each part of the body is utilized to determine the most conflicting ergonomic factors.

The following are the major drawbacks (Hita-Gutiérrez et al., 2021; Cuixart, 2001):

a. It can only be used to analyse specific postures. An analysis of a set or sequence of postures is not possible.

b. Task evaluations are subject to the evaluator's discretion. Some of the stances taken may or may not be scrutinised.

c. It just assesses the level of effort. Throughout the working day, the frequency of postures and the duration of exposure.

One of the conditions of the procedure is that the worker consents to the collection of the essential data. All of the tasks to be evaluated are observed by the evaluators. Direct observation, video recording, or photographing can all be used to complete an observation. The goal is for collecting data which will allow the procedure to provide outcomes.

On the other hand, the approach varies from others in several manners. Amongst the most significant changes is that it considers the worker's lower extremities (Boyd, 2021; Hignett & McAtamney, 2000). Another assessment approaches, namely Rapid Upper Limb Assessment (RULA) McAtamney & Corlett (1993), never consider this. By no means a method is considered superior or worse approaches; they are used based on the circumstances and resources of the evaluators (Hita-Gutiérrez et al., 2021; Takala et al., 2010).

It needs to become highlighted where after an approach gets issued, it is critical to understand its global implementation over time. The influence of the REBA approach on the community can be justified by looking at how it has been used since its inception.

The main purpose of this study is to conduct a bibliographic research of the REBA technique Hignett & McAtamney (2000) implementation in various domains of knowledge, nations, years, and journals from May 2002 to July 2019. Additionally, the goal of the current research is to tally the amount of instances REBA was used in conjunction with other treatments, as well as the resulting incidence. Finally, one goal is to show that it was used within the health profession and application in global events.

2.5 Occupational Safety and Health (OSH) In Malaysia

A legal framework for upholding the welfare, health, and safety for every worker in Malaysia along with protecting others from risks towards their health or safety arising from their work tasks was established by the Occupational Safety and Health Act 1994. It was gazetted on 24th of February 1994 and a helpful tool in combination with other available legislation related to health and safety (Malaysia Federal Legislation, 2022).

The purpose of OSHA 1994 is; "to secure the safety, health and welfare of persons at work against risks to safety or health arising out of the activities of persons at work; to protect persons at a place of work other than persons at work against risks to safety or health arising out of the activities of persons at work; to promote an occupational environment for persons at work which is adapted to their physiological and psychological needs and; to provide the means whereby the associated occupational safety and health legislation may be progressively replaced by a system of regulations and approved industry codes of practice operating in combination with the provisions of this Act designed to maintain or improve the standards of safety and health" (Occupational Safety and Health Act, 1994).

The self-regulation initiatives serve as the foundation for the guidelines of the Act (Department of Occupational Safety and Health, 2016). Its main duty has been developed to make sure that the people who produce the risks and the people who work with them are safe and healthy. This Act also intends to foster effective safety and health performance and organisation via self-regulating initiatives tailored to the specific organisation or industry. The idea of self-regulation promotes consultation,

collaboration, and involvement between management and workers in attempts to raise workplace health and safety standards.

Enforcing the OSHA 1994 is the responsibility of the Body of Occupational Safety and Health (DOSH), a government agency under the Ministry of Human Resources Malaysia. By enforcing and promoting adherence to current laws, regulations, and codes of practice, The DOSH will make sure that employers, self-employed people, importers, manufacturers, suppliers, designers, and workers all practice a safe and healthy work environment. As a basis for assuring safety and health in workplace, the DOSH also intends to create and evaluate legislations pertaining to occupational safety, health, and welfare (Department of Occupational Safety and Health, 2019).

The National Council for Occupational Safety and Health (NCOSH) was founded in 1994 in accordance with Section 8 of the OSHA 1994, and the DOSH acts as its secretariat (Department of Occupational Safety and Health, 2015). The National Council for Occupational Safety and Health is empowered to take any action that is practical, reasonably required, or relevant to achieving the objectives of the Act. The Constitution directs the legislative structure of OSH in Malaysia. In addition, the OSH legislative framework in Malaysia is completed by regulations (particularly those under the three major OSH laws), orders, and Director General Circulars.

2.6 Occupational Safety and Health (OSH) Module and Training

To promote workplace safety, Occupational Safety and Health (OSH) training has been implemented and widely followed. The goal of safety and health training is to

instil safety information and skills in employees while also developing safe work habits to decrease workplace accidents (Liu & Li, 2022; Weinstock & Slatin, 2012).

It is possible to use many different ways to provide safety and health training, ranging from the minimum to the most stimulating (Liu & Li, 2022; Sacks et al., 2013). Least stimulating teaching techniques includes the one which involve barely any interaction between the trainer and the trainee. Lectures with no involvement, movies, brochures, handbooks devoid of practices, computer teaching with minimal participation or input, and discussion are only a few examples. Conversely, higher stimulation training techniques refer to approaches that have participants apply training subject principles in a virtual reality or real-world work environments, and behavioural modelling.

A study conducted by Burke et al. (2006) undertook the initial research on analysing the effectiveness of different kinds of worker safety and health training, which included 95 publications among the year 1971 and 2003. Their findings showed that training methods with varying degrees of engagement could effectively enhance trainees' behavioural skills. Despite this, once training techniques turned into a much higher engagement, such as forcing an active engagement from trainees, employees displayed improved information acquisition and accident rates decreased (Stefan et al., 2024; Burke et al., 2006).

Robson et al. (2010) conducted a similar study as a continuation to a research on the efficacy of training on safety and reviewed previous study by Burke et al. (2006). According to Robson's research, safety training helps change behaviour of the worker. Additionally, as he highlighted in his assessment of the prior research, a risk of bias may be present in their study because they self-selected the data.

His findings have been refuted by earlier research on the training's benefits for attitude, knowledge, and health. He stated that there is inadequate research has been done to demonstrate that training with a high level of involvement produces better training results than training with a medium or low level of engagement (Van Assen, 2020; Robson et al., 2010). His research also shows that insufficient data exist to discern the training effect between low/medium and high engagement training in a one class session.

Brahm and Singer (2013) suggested that organisations' training techniques should be determined through their OSH commitments and capabilities rather than a single training strategy (Ojha et al., 2020). They emphasized that there is no one training approach that is better than the others. They went on to say that training should be broken down into stages, with declarative knowledge being transferred using rationalistic and less engaging ways first, and procedural knowledge being transferred using more engaging approaches.

An intervention in training is regarded as a risk control strategy intended to enhance employees' attitudes, knowledge, and abilities about safe, healthy working practices and workplace dangers. The National Institute for Occupational Safety and Health (2015) lists elimination, substitution, and engineering control as the three more dependable risk control strategies that can be supplemented by training intervention, which is classified as a type of "administrative control" within the risk control hierarchy. Because training interventions rely on an individual's capacity and willingness to retain, maintain, and practice what they have learned in the class, they are typically regarded as less effective. Its susceptibility is linked to people's innate

propensity for making mistakes. This tendency impacts all parties involved in the training process that includes program developers, instructors, and trainees. To safeguard employees from occupational dangers, training interventions must be utilized as a risk control tool in conjunction with further, more dependable approaches, not as the only kind of intervention (Foulis, 2021).

However, OSH training interventions are becoming more and more common in the workplace. According to the Human Resource Development Fund, RM700 million was spent on training expenses in Malaysia alone in 2019, an increase of 8% from the year before (Human Resource Development Fund, 2020). Meanwhile, between 2013 and 2016, an average of 126,000 people was trained annually by the National Institute of Occupational Safety and Health (NIOSH), the largest facilitator of training related to occupational safety and health in Malaysia (National Institute of Occupational Safety and Health, n.d.). The number showed how hard stakeholders had worked to get the workers on the training program while highlighting the value of training for the nation's economy and the advancement of its most valuable resource, its people.

Conversely, the specifications for OSH training are quite loose, and the training provider must match the demands of the open market (Kamal et al., 2021). It might take place at the client's location or at the training providers. This type of training can be fixed (generic) in length, content, and delivery, or it can be tailored to the specific requirements of the customer. When a company employs highly skilled individuals, internal training takes place without any involvement from outside parties. The most common method is instructor-led training, and the effectiveness of the instruction depends on the years of experience and skill of the trainer (Bęś & Strzałkowski, 2024; Tews & Noe, 2019).

The main goal of OSH training is to empower employees to identify recognized risks and implement appropriate safety measures. On the other hand, worker education equips a person with the knowledge and skills necessary to address unforeseen issues or possible risks. It does this by offering direction on how to become better informed and take action aimed at removing the hazard (Liu & Li, 2022; Asari & Leman, 2015; Cohen et al., 1998). To prevent accidents, it is imperative to improve the knowledge, abilities, attitudes, and habits of everyone involved. Numerous researchers have used meta-analyses, qualitative methods, and quantitative methods to describe the efficacy of OSH training. The majority of findings point to a significant improvement in employees' knowledge, abilities, and attitudes about the application of OSH through OSH training (Bęś & Strzałkowski, 2024; Aziz & Osman, 2019). It is noteworthy that increased knowledge of active methods like workshops and outside training courses has a stronger correlation with improved safety training than does the passive strategy (Bęś & Strzałkowski, 2024; Konijn et al., 2018). In particular, the practical component of a training program involving risk prevention solution seeking was clearly grasped by farmers (Kamal et al., 2021; Holte & Follo, 2018).

This literature overviews the elements of the ergonomic and psychosocial factors in relation to WMSDs research done by the previous scholar. The present study discusses the effects and connection of both ergonomic and psychosocial risk among Malaysian police as they work and possible health impacts classified as WMSDs. Apart from that, the chapter describes a recommendation of tackling both factors as a new approach under attention in recent years to prevent and control the risk of WMSDs. The findings conclude with the gap that is inadequate of an understanding of the psychosocial and ergonomic factors that are important elements in the intervention program to reduce

WMSDs. Another gap that needs to be addressed is the multiple factors intervention approach to prevent and control WMSDs as recommended by previous scholars in producing successful strategies.

2.7 Conceptual Framework

Traffic police officers encounter various hazards during their duties, which include psychosocial, biological, chemical, physical, and ergonomic factors (Jamil et al., 2021; Paudel et al., 2018). Research has identified several psychosocial factors affecting traffic police officers, such as administrative issues, lack of leadership support, poor interpersonal relationships, physical assaults, and insufficient public support (McCreary & Thompson, 2006; Irniza et al., 2014; Violanti et al., 2016; Rasdi, 2018; Mamat et al., 2022). Additionally, Krick and Felfe (2020) highlighted that administrative problems, particularly regarding poor job and task design, staff shortages, and extended working hours, are prevalent psychosocial factors affecting these officers. These factors can lead to increased stress levels among traffic police (Mamat et al., 2022; Rahman et al., 2017). Ergonomic issues, such as prolonged standing, repetitive motion, and awkward postures, are also significant concerns due to the nature of their work (Dey et al., 2023; Carayon et al., 1999). If these factors, along with stress, persist, traffic police officers may develop Musculoskeletal Disorders (MSDs). This research focuses on psychosocial factors, ergonomic factors, and MSDs to further understand their correlation and significance for traffic police officers in Malaysia. However, hand arm vibration (HAV) factors were not considered in this research as to focus more on awkward posture. Figure 1 illustrates the conceptual framework.

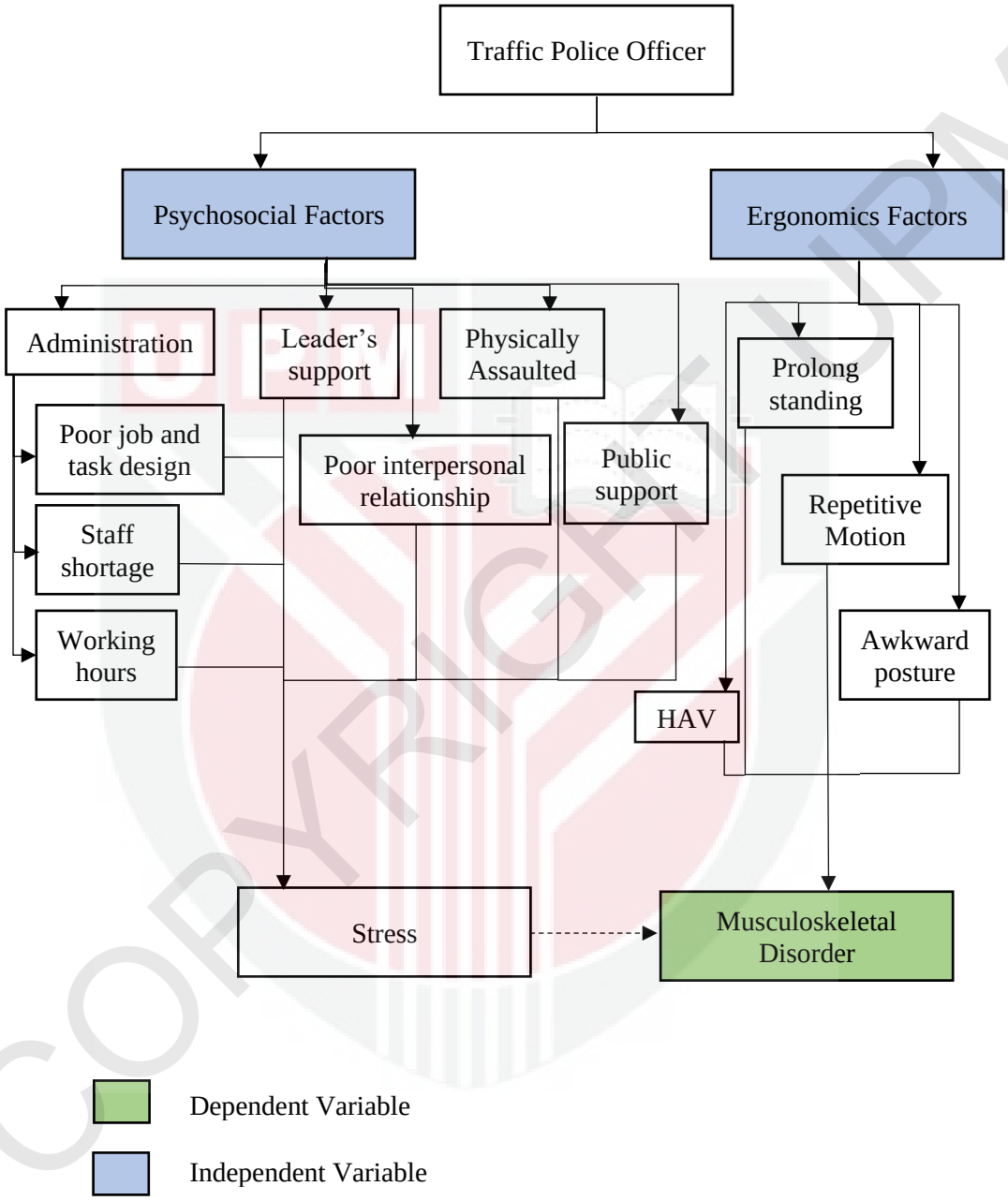


Figure 1: Current research conceptual framework

CHAPTER 3

METHODOLOGY

3.1 Study Location

This study was performed in peninsular Malaysia at the District Police Headquarters, known as Ibu Pejabat Polis Daerah (IPD) for each state. This is because the District Police Headquarters have a great number of traffic police officers as they are responsible for the entire part of the respective district, thus susceptible to being exposed to this study variables. A total of 18 IPDs were approved by the Deputy Director 1 of Department of Investigation and Traffic Enforcement Bukit Aman to conduct data collection by Ibu Pejabat Polis Bukit Aman. The approval letter can be referred to APPENDIX B.

3.2 Study Design

A cross-sectional survey was used and 408 traffic police officers were recruited with the view of examining the ergonomics hazards associated with their task and job. The research design was used to predict the findings towards a larger population via a structured process (Wang & Cheng, 2020; Borrego et al., 2009). The police were recruited via a simple random sampling from the list given by the Officer in Charge.

3.3 Study Duration

The duration of this study is 2 years; starting from the 1st of September 2022 until the 31st of August 2024. Data collection was conducted for 5 months starting from July 2023 until November 2023.

3.4 Sampling

3.4.1 Study Population

Male traffic police officers in Peninsular Malaysia. Male participants were selected to avoid bias, considering that the majority of traffic police officers are male. A previous study by Thien et al. (2022) reported that 87% of traffic police officers are male, while only 13% are female.

3.4.2 Sampling Population, Sampling Frame and Sampling Unit

The study population involved 408 male traffic police officers in peninsular Malaysia. The sampling frame was obtained from the list of names of all officers working at the Police Station, obtained from the Registrar Department. The sampling unit is traffic police officers.

3.4.3 Selection Criteria

Officers in this study were chosen as respondents through the following inclusive criteria: male, front-line officers (directly work or interact with the public daily) and being employed in the current police station for at least 12 months. Twelve months were selected because the NMQ requires police officers to record pain experienced within that timeframe in their current job apart from chronic pain was defined as pain that recurs or persists for more than three months (Bonanni et al., 2022). Meanwhile for the exclusion criteria: those who are diagnosed with MSDs prior to working as a traffic police officer.

3.4.4 Sampling Technique (Method)

The sampling frame was obtained from the list of names of all officers employed at the Police Station, obtained from the Registrar Department. Only respondents who met the requirements were chosen to participate in the research. In order to confirm their eligibility, respondents were requested to complete the presurvey form. Simple random sampling was used for this investigation, where each subject's name was numbered on paper and placed in a container. The subjects were then selected at random using the Fishbowl Technique.

3.4.5 Sampling Size

The Lemeshow et al. (1990) formula was utilized to calculate the sample size for traffic police officers. The mean value of health problems among police officers in Malaysia was taken from a previous study performed by Diyana et al. (2019).

$$n = \frac{Z^2_{\left(1-\frac{\alpha}{2}\right)} P(1-P)}{d^2}$$

Eq. 3.1

Where

$Z_{\left(1-\frac{\alpha}{2}\right)}$ = Z-score (1.96 for 95% confidence interval)

P = 67.9% of police officers reported musculoskeletal disorders

d = Absolute precision required on either side of proportion (Margin of error is ± 5% or 0.05)

The estimated sample size calculated as below:

$$n = \frac{1.96^2 \times 0.68(1 - 0.68)}{(0.05)^2}$$

$$= \frac{3.8416 \times 0.68 \times 0.32}{0.0025}$$

$$\approx 334\ respondents$$

Eq. 3.2

A minimum 10% of additional respondents overall were needed to reject questionnaire samples and counter-respond to cases (Martínez-Mesa et al., 2014).

$$= 334 + [(334 \div 0.9) \times 0.2]$$

$$= 408.22$$

$$\approx 408\ respondents$$

Following the extra adjustment had been done, the total sample size for the current research was 408 traffic police officers. A total of 408 traffic police officers were considered to participate in this research to assess all of the objectives from this research using questionnaires and REBA tools.

3.5 Instrument

3.5.1 Rapid Entire Body Assessment (REBA)

This study employed the Rapid Entire Body Assessment (REBA) to "rapidly" assess the risk of musculoskeletal disorders (MSDs) among Malaysian traffic police riders

related to certain job duties. This tool assesses the biomechanical and MSDs risks related to the work task under evaluation by systematically assessing the upper and lower musculoskeletal systems. To assess required or chosen body posture, forceful exertions, type of movement or action, repetition, and coupling in traffic police work activities, utilize the one-page worksheet as shown in Figure 2.

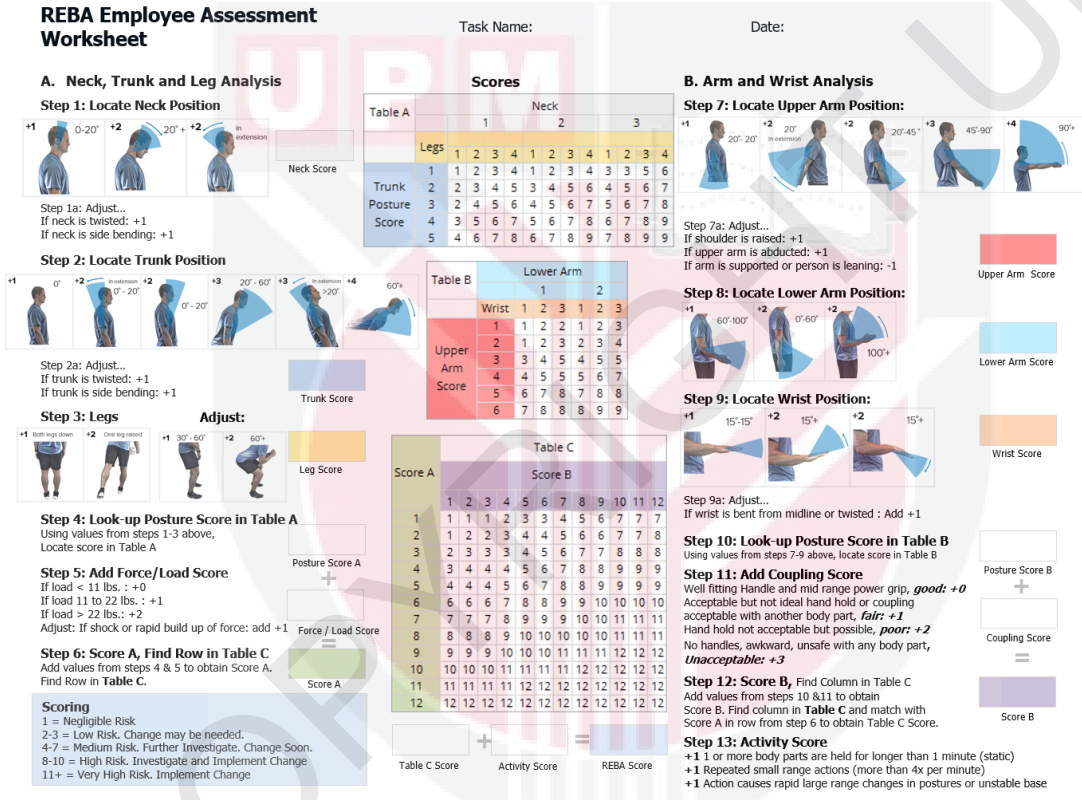


Figure 2: The REBA tool for employee assessment worksheet
(Source: Hignett & McAtamney, 2000)

3.5.2 Questionnaire

A detailed questionnaire was designed by referring to Yusof (2016) and used to capture the information needed from the respondents. The Malay Language was used throughout the whole questionnaire as suited to the population targeted. This

questionnaire comprises of five (5) sections, which are, Part A (individual information), B (lifestyle information), C (occupational information), D (Musculoskeletal Nordic), and E (Stress information). This questionnaire was used to support the results from REBA, interviews, and focus group discussions as a piece of evidence and at the same time, it generates and produces occupational safety and health data for Malaysian traffic police officers. The respondents were given this questionnaire in a meeting room during their break. Each respondent received a brief explanation of the questionnaire and was asked to sign a consent form in writing before they could take part in the study.

Part A: Individual Information

This section is a close-ended question where the respondents must fill in the information related to their sociodemographic such as age, race and education level. The data from this part were then be linked to the prevalence of MSDs among traffic police officers.

Part B: Lifestyle Information

The questions in this part were asked about their lifestyle in terms of smoking behaviour, physical activities, and sleep difficulties where these factors may be related to stress and MSDs.

Part C: Occupational Information

Close-ended questions were used to gather the occupational information from respondents. The questions asked were about the working history and working duration which are related to the prevalence of MSD among the traffic police officers.

Part D: Musculoskeletal Nordic

The Standardized Nordic Musculoskeletal Questionnaires (NMQ) by Kuorinka et al. (1987) were utilised to measure MSD where the respondent reported where they feel the pain on the checklist provided. The questionnaire consists of 40 forced-choice items that identify the body area that caused musculoskeletal problems in the last 12 months and the last 7 days that limited them from conducting normal activity (Crawford, 2007). The nine body parts available on the checklist were neck, shoulder, upper back, elbows, wrists/hands, low back, hips/thighs, knees, and ankle/feet. For any 'yes' checked in any part of the body was considered as the presence of MSDs.

Part E: Stress Information

To measure the psychosocial factors among the traffic police officers, the Police Stress Questionnaire (PSQ) was taken where the instrument is a combination of two validated instruments; Police Stress Questionnaire Operational (PSQ-OP) and Police Stress Questionnaire Organisational (PSQ-ORG). The PSQ-OP asks questions related to the aspect of stressors that contribute to policing duty for example "Shift Work", "Working alone at night", and "Overtime demands" while PSQ-ORG questions on stressors linked with the organisation and organisation culture in the working environment for example "Excessive administrative duties", "Too much computer work", and "Perceived pressure to volunteer free time" (McCreary & Thompson, 2006; Irniza et al., 2014). It consists of 40 questions in the form of 7-point Likert scale questions where the questions were asked on things in the aspects of police officers that will make them feel stressed. Each item was given a score scale of 7-point Likert scale ranging from 1 to 7 in which 1 indicates no stress at all, 2 (filler), 3 (filler), 4 (moderate stress), 5 (filler), 6 (filler), and 7 (a lot of stress) (McCreary & Thompson, 2006). The scoring method for this instrument was done by putting a score of 1 for no

stress at all, 2 for filler, 3 for filler, 4 for moderate stress, 5 for filler, 6 for filler, and 7 for a lot of stress. The respondent needs to choose only one score scale for each item. The score scale chosen was then summed up and averaged to see the results in which a high score indicates strong factors of stress, thus one of the psychosocial factors does lead to stress. The final scoring of this scale was in the value of 0.0 to 7.0 where 0.0 to 2.0 is categorized as low stress, 2.1 to 3.4 as moderate stress and 3.5 to 7.0 as high stress.

3.6 Validity and Reliability of Instrument

For quality control, the validity of the self-administered questionnaire was assessed by three police officers and two ergonomics experts to certify that the questionnaire measures what it is intended to measure and reflects the purpose of the study. A pre-test on 31 police officers was also conducted in conjunction with recommendations by Perneger et al. (2015) to recruit 30 participants which was found sufficient to address common problems to get the reliability value of the questionnaire. The Overall Cronbach's Alpha for the questionnaire was 0.900.

From the feedback by the police officers, 2 questions were taken out as they believed it was irrelevant towards the task performed by traffic police officers. The questions were item 37 "internal investigations" and item 40 "inadequate equipment".

3.6.1 Rapid Entire Body Assessment (REBA)

A prior study indicates moderate inter-rater reliability (IRR) (Fleiss kappa = 0.54) for a categorical scoring of REBA and good intra-rater reliability (ICC = 0.925) for REBA raw scores (Schwartz et al., 2019).

3.6.2 Nordic Musculoskeletal Questionnaire (NMQ)

The NMQ has been tested for reliability and validity and shows a good reliability value with Cronbach's Alpha 0.945 (Chairani, 2020). From the pre-test conducted, the Malay version of NMQ has an acceptable reliability value of 0.990 to be conducted on Malaysian traffic police officers.

3.6.3 Police Stress Questionnaire (PSQ)

The result from the pre-test shows that the Malay version PSQ has an acceptable reliability value with Cronbach's Alpha 0.987 for overall PSQ, 0.971 for PSQ-OP, 0.955 for social-related issues item, 0.939 for work-related issues, 0.981 for PSQ-ORG, 0.981 for poor management issues, and 0.931 for responsibilities issues. The values are comparable to the reliability value by McCreary and Thompson (2006) with PSQ-Op having Cronbach's Alpha 0.93 and PSQ-Org with 0.92.

3.7 Data Collection Technique

The Registrar Department's list of all the officers employed by the Police Station served as the sample frame. Only respondents who met the requirements were chosen to participate in the research. In order to confirm their eligibility, respondents were requested to complete the presurvey form. The sample strategy used in this study was simple random sampling, wherein the names of all eligible participants were numbered on paper and placed in a container. The respondents were then selected at random using the Fishbowl Technique. Figure 3 illustrates the flow of this research.

This study was conducted in 3 steps to fulfil the study's objectives.

1. Information on sociodemographic factors, self-reported musculoskeletal disorders, and psychosocial factors among Malaysian traffic police officers were assessed using a self-administered questionnaire.

2. All potential ergonomics hazards were assessed using REBA with Malaysian traffic police officers.

3. From these two steps, the gathered results were used to develop an educational ergonomic module suitable to the traffic police working environment and task, which will create opportunities towards the implementation of OSH in Malaysia among the traffic police officers.

3.7.1 Development of Educational Ergonomics Module for Malaysian Traffic Police Officers

To develop this educational ergonomics module, a characteristic feature of this educational ergonomics module is the formation of an ergonomic team or expert team from various fields that represents the officer-in-charge (police), ergonomists, research experts, and health and safety personnel involved. Through a strong basis of ergonomics concepts and methods in place, the organisation utilizes its newly developed ergonomics module to improve their workplace. The obtained information from the respondents including REBA were being used to develop training modules specifically tailored to the work task of traffic police to make sure meaningful and effective training can be produced. This module will then be reviewed and validated by this team via the survey before finalizing. This educational ergonomics module may be utilized to make sure that traffic police officers are protected by the OSHA 1994 laws and guidelines.

3.7.2 Variables and Operational Definitions

Dependent Variables

Musculoskeletal Disorders (MSDs)

MSDs is interpreted as disorders or injuries of the muscles, tendons, nerves, spinal discs, cartilage, and joints which are being assessed via Musculoskeletal Nordic. The MSDs were expected to occur due to the cause of traffic police duties.

Independent Variables

Psychosocial Factors And Ergonomics Factors

Psychosocial factors are interpreted as work demands, job content, and social support that lead to stress. It is measured through Part B on lifestyle information, Part C on occupational information, and Part E on stress information.

Ergonomic factors are defined as factors such as prolonged standing, repetitive movement, and awkward posture that occur throughout traffic police duties and it is measured through REBA.

3.8 Data Analysis

IBM SPSS (Statistical Package for the Social Science) version 26 was used to analyse all of the questionnaire data. Both univariate and bivariate analysis were used to analyse the data. A 95% confidence interval and 80% power were used in the study, and $p \leq 0.05$ was deemed as statistically significant. In this investigation, Kolmogorov-Smirnov was utilized to ascertain whether the variables' data distribution was normally distributed. When the p-value is greater than 0.05, the distribution of the data is

presumed to be normal. Descriptive analysis was utilized to identify the frequencies, mean and percentages of the results. Besides that, for analytical analysis, a logistic regression was used to find correlations, a correlation test utilized for two numerical variables while a chi-square test for two categorical variables. A logistic regression was also performed for a mixture of both numerical and categorical variables.

3.9 Ethical Consideration

3.9.1 Subject Vulnerability

Informed consent was given for all the participants before being taken as the subject of this study. Only those who were willing and volunteered to participate were chosen. The participants have the right to quit the study and there will be no penalty given to them for leaving the study. After the survey is completed, all the information and data that has been collected was taken immediately, into encrypted forms, and it is only accessible by the researchers and supervisor. This is to make sure that the participant's privacy and confidentiality are protected. Apart from that, the survey forms were made to be anonymous and confidential from the private data of respondents. As soon as the study is completed and has been interpreted, all data will not be stored by the researchers.

3.9.2 Measures Taken

This study had considered the ethical considerations that have been underlined by obtaining approval from the Ethics Committee for Research Involving Human Subjects (JKEUPM) in order to make sure that our study will be conducted properly. On 18th January 2023, the permission from JKEUPM (reference number: JKEUPM-

2022-1049) was acquired to perform this study before proceeded with the data collection. It was then further made sure that all subjects were not affected by this study by making sure that all parts of this study comply with the guidelines provided by JKEUPM. This research has also been permitted from Bukit Aman Headquarters before conducting data collection.

3.9.3 Identify Vulnerable Groups

Vulnerable groups that were identified will be excluded from this study. The vulnerable groups include those who are diagnosed with MSDs prior to working as traffic police officers. Only those who fulfilled the requirements to participate in this research were selected.

3.10 Honorarium and Incentives to Respondents

For each respondent, RM10 was given as an honorarium after the completion of data collection for participating in this research.

3.11 Study Flowchart

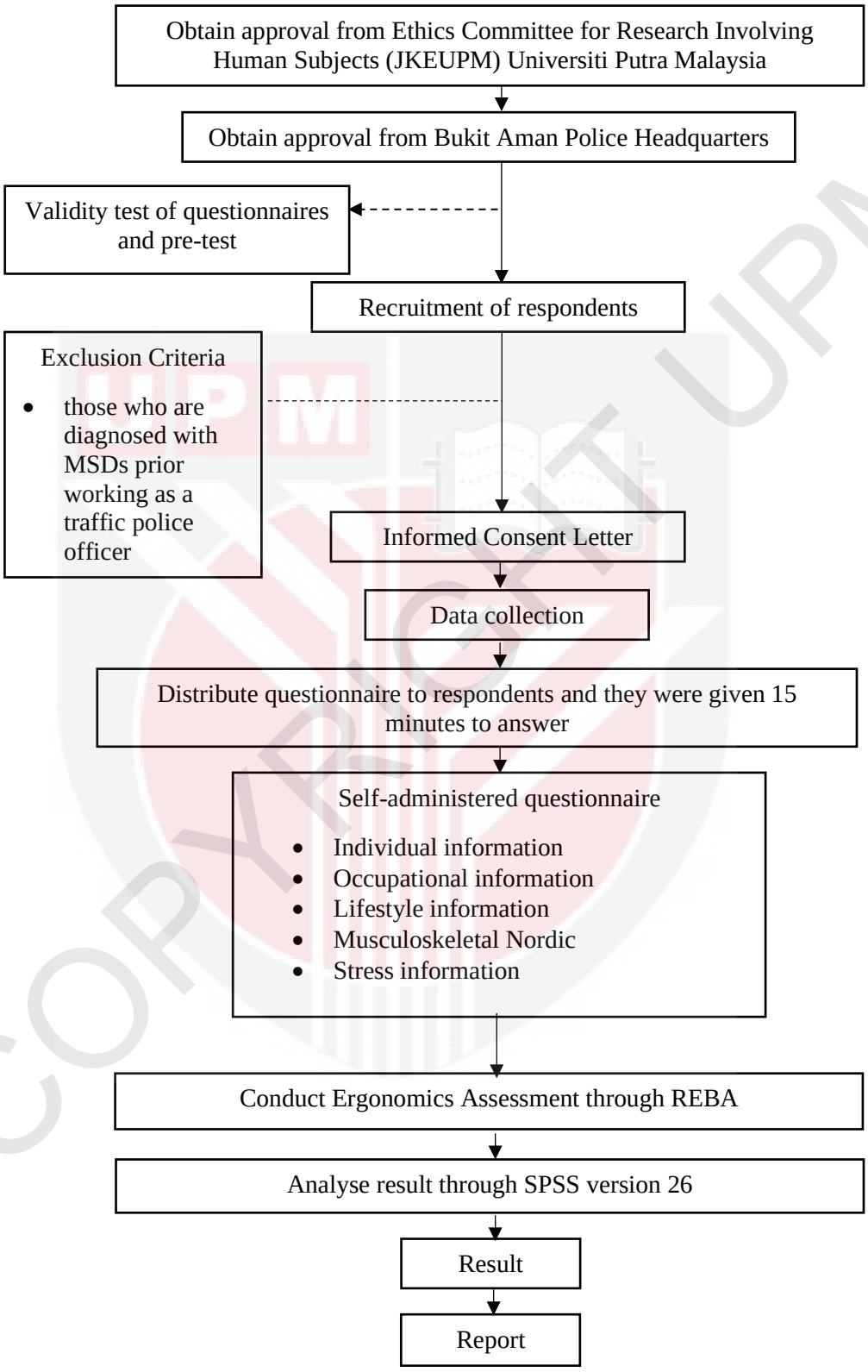


Figure 3: Current research flowchart

CHAPTER 4

RESULTS

This study has acquired an acceptable response rate which is an 89.71% response rate acquired with 366 respondents out of 408 respondents needed. The reason for not reaching the target of 408 respondents was due to a limited number of individuals approved by PDRM to participate in this study. Additionally, many respondents had hectic schedules that caused them to skip some questions because of time constraints.

4.1 Prevalence of MSDs And Psychosocial Factors

In this study, the prevalence of self-reported MSDs acquired from NMQ is 60.7% which amounts to 222 respondents for at least one body part reported. The highest prevalence reported is on the neck with 45.6% followed by the shoulder (43.2%) and the least reported body part is the elbow with 13.9% of respondents having the pain. The full list of percentages for each body reported in NMQ is provided in Table 4.1.

Table 4.1: Prevalence of Musculoskeletal Disorders (MSDs) based on body parts among Malaysian traffic police

Body parts	Prevalence of self-reported MSDs	
	Frequency (N=366)	%
Neck	167	45.6
Shoulder	158	43.2
Upper back	138	37.7
Elbow	51	13.9
Hand/wrist	114	31.1
Lower back	127	34.7
Hips/thigh	134	36.6
Knee	119	32.5

Table 4.1: Continued

Body parts	Prevalence of self-reported MSDs	
	Frequency (N=366)	%
Leg/ankle	127	34.7
Total MSDs	222	60.7

Meanwhile as described in Table 4.2, the prevalence of stress reported through PSQ is 90.2% with 330 respondents which also indicates that almost all the respondents are stressed with the psychosocial stressors in this study. To categorize further the psychosocial factors prevalence, 50.3% indicates high stress for operational factors and 42.1% of high stress for organisational factors. The former is 11% higher compared to the latter. However, for medium stress, operational factors acquire 38.0%, a few percent lower compared to organisational with 41.8%. the summation of both categories is almost near 90% which is considered a majority of the respondents concurred with the factors. The details can be referred to in Table 4.3. Only less than 20% of respondents indicate that both factors give them low stress.

Table 4.2: Prevalence of psychosocial stress among Malaysian traffic police

Psychosocial stress	Prevalence of psychosocial stress	
	Frequency (N=366)	%
Yes	330	90.2
No	36	9.8

Table 4.3: Prevalence of psychosocial stress by stressors two main category among Malaysian traffic police

Stressors	Prevalence of psychosocial stress					
	Frequency (N=366)			%		
	Low	Medium	High	Low	Medium	High
Operational	43	139	184	11.7	38.0	50.3
Organisational	59	153	154	16.1	41.8	42.1

The operational factors in this study reported a mean of 3.43±1.06 while organisational is a bit higher at 3.60±1.13. Both are further categorized into two respective aspects. In operational, work-related is much more prominent with a reported mean of 3.50±1.08 a bit higher compared to social-related factors. For the organisational aspect, poor management/lack of resources is more prominent with a mean of 3.80±1.24 much higher as compared to responsibilities with a mean of 3.36±1.09. The details can be referred to in Table 4.4.

Table 4.4: Mean of psychosocial factors based on specific category among Malaysian traffic police (N=366)

Psychosocial factors	Mean	Std. deviation
Operational	3.43	1.06
Social-related	3.33	1.17
Work-related	3.50	1.08
Organisational	3.60	1.13
Poor management/lack of resource	3.80	1.24
Responsibilities	3.36	1.09
Overall psychosocial stress	3.51	1.06

Referring to Table 4.5, the questions that have the highest reported mean are staff shortages with a mean of 4.07±1.57, followed by fatigue with a mean of 4.04±1.55, and the least prominent question is dealing with colleagues with a mean of 2.98±1.38.

Table 4.5: Mean of psychosocial stressors for each factor among Malaysian traffic police (N=366)

Psychosocial factors	Mean	Std. deviation
Shift Work	3.50	1.41
Working alone at night	3.53	1.53
Overtime demands	3.93	1.54
Risk of being injured on the job	3.55	1.55
Work-related activities on days off (e.g., court and community events)	3.49	1.50
Paperwork	3.39	1.49
Excessive administrative duties	3.52	1.46
Too much computer work	3.57	1.45
Fatigue (Example: shift work and overtime)	4.04	1.55
Perceived pressure to volunteer free time	3.77	1.45
Unequal sharing of work-responsibilities	3.66	1.42
Dealing with superiors	3.59	1.44
Dealing with the court system	3.45	1.42
Dealing with colleagues	2.98	1.38
Constant changes in policy/legislation	3.95	1.54
Staff shortages	4.07	1.57
Too much bureaucracy (eg; multiple levels and complicated processes)	4.01	1.55
Lack of training on new equipment	3.47	1.37
Inconsistent leadership style of the superior	3.90	1.58
Lack of resources (example: information equipment)	3.95	1.54
Leaders over-emphasise the negatives, (e.g., supervisor evaluations, public complaints)	3.77	1.62

Table 4.5: Continued

Psychosocial factors	Mean	Std. deviation
Traumatic events (domestic violence, death, injury and witness tragic accidents)	3.21	1.44
Feeling like you are always on the job	3.58	1.49
The feeling that different rules apply to different people, (e.g., favouritism)	3.73	1.58
Feelings like you always have to prove yourself to the organisation	3.24	1.35
The need to be accountable for doing your job	3.21	1.36
Occupational related health issues, (e.g., back pain, neck pain, joint pain)	3.61	1.43
If you are sick or injured your co-workers seem to look down on you	3.05	1.39
Eating healthy at work (e.g., not eating fast food)	3.09	1.35
Finding time to stay in good physical condition (e.g., exercise)	3.14	1.43
Managing your social life outside work	3.12	1.40
Not enough time to spend with friends and family	3.76	1.58
Lack of understanding from family and friends about your work	3.34	1.40
Making friends outside the job	2.95	1.27
Upholding a higher image in public	2.94	1.43
Negative comments from the public	3.60	1.57
Limitation to your social life	3.37	1.50
Friends/family feel the effects of the stigma associated with your job	3.35	1.54

4.2 Potential Awkward Posture

The results from the REBA assessment are then categorized in Table 4.6. About 96.9% of the work tasks performed are considered awkward postures amounting to 31 out of 32 assessed respondents.

Table 4.6: Prevalence of awkward posture among Malaysian traffic police

Awkward posture	Prevalence of awkward posture	
	Frequency (N=32)	%
Yes	31	96.9
No	1	3.1

According to Table 4.7, most of the tasks performed are considered as medium risk with 71.9% of respondents that were assessed, followed by 25.0% considered as high risk, and only 3.1% as low risk.

Table 4.7: Prevalence of risk category based on REBA among Malaysian traffic police

REBA category	Frequency (N=32)	%
Low risk	1	3.1
Medium risk	23	71.9
High risk	8	25.0

The details of the REBA categorisation based on each work task to perform a duty can be referred to in Table 4.8. Five work tasks that were assessed during data collection are roadblock, traffic control, ticketing, motor ride, and packing roadblock tools. This task was observed during their daily operational duty. Roadblock has the highest frequency in medium risk with 68.4% followed by 31.6% evaluated as high risk.

Traffic control and motor riding were assessed as medium risk with 100.0% of respondents recorded. In ticketing duty, 66.7% were evaluated as medium risk while the other 33.3% were recorded as low risk. Lastly, tasks related to packing roadblock tools, it was evaluated as high risk with 100.0% of the respondents. For the task that falls in the category of low risk, it was not considered as awkward posture while the tasks that fall under medium and high risk were considered as an awkward posture task. Figure 4 is a photograph depicting one of the traffic police officers assessed in this study for his posture while performing traffic control duties. A red line has been drawn to indicate the hand position that deviates from the natural position according to the Rapid Entire Body Assessment (REBA).

Table 4.8: Detailed prevalence of awkward posture based on each work task observed among Malaysian traffic police

Work task	REBA category	Frequency (N=32)	%	Awkward posture
Roadblock	Medium risk	13	68.4	Yes
	High risk	6	31.6	Yes
Traffic control	Medium risk	6	100.0	Yes
Ticketing	Low risk	1	33.3	No
	Medium risk	2	66.7	Yes
Motor ride	Medium risk	2	100.0	Yes
Packing roadblock tools	High risk	2	100.0	Yes

*Medium and high risk are considered as awkward posture

Figure 4: An example of measuring REBA angle of an officer performing traffic control duty (Source: Zakaria, 2023)

4.3 Association Between REBA Score and Risk Factors (Sociodemographic Characteristics, Lifestyle, And Occupational Factors)

To associate two categories of variables which are REBA score and risk factors, the chi-square test for independence has been performed for 32 respondents and Fisher's exact test has been utilised as the assumptions are violated >20.0%. By looking at Table 4.9 which reports the chi-square result analysis, none of the factors; sociodemographic, lifestyle and occupational factors, are linked with the presence of awkward posture as all of them are not significantly different $p > 0.05$.

Table 4.9: Association between REBA score and risk factors present among Malaysian traffic police (N=32)

Variables	Total Awkward Posture		Statistics (X^2)	Significant (p-value)
	Yes N(%)	No N(%)		
Age				
≤35 years old	17	1	N/A	1.000
≥36 years old	14	0		
Marital status				

Table 4.9: Continued

Variables	Total Awkward Posture		Statistics (X^2)	Significant (p-value)
	Yes N(%)	No N(%)		
Single	5	0	N/A	1.000
Married	26	1		
Education level				
Secondary school	19	1	N/A	0.619
Certificate/Diploma	9	0		
Degree and above	3	0		
Salary				
≤RM2000	15	1		1.000
≥RM2001	16	0		
BMI				
Normal	17	1		1.000
Abnormal	14	0		
Family members				
≤3	12	1		0.406
≥4	19	0		
Medicine intake				
Yes	1	0		1.000
No	30	1		
Smoking				
Yes	18	1		1.000
No	13	0		
Physical activity				
Yes	24	1		1.000
No	7	0		
Sleep difficulty				
Yes	5	1		0.188
No	26	0		
Work history				

Table 4.9: Continued

Variables	Total Awkward Posture		Statistics (X^2)	Significant (p-value)
	Yes N(%)	No N(%)		
Yes	18	1		1.000
No	13	0		
Rank				
Constable	4	0	N/A	0.412
Lance Corporal	7	1		
Corporal	17	0		
Sergeant	3	0		
Working experience				
≤15 years	22	1		1.000
≥16 years	9	0		
Shift hours				
1	1	0	N/A	0.900
8	23	1		
16	1	0		
24	6	0		
Shift type				
Morning	1	0		1.000
Both	30	1		
Working hours				
≤8 hours	23	0		0.281
≥9 hours	8	1		
Task duration				
1-4 hours	1	0	N/A	0.841
5-8 hours	26	1		
9-12 hours	4	0		
Break time				
30 minutes	11	1	N/A	0.365
60 minutes	17	0		

Table 4.9: Continued

Variables	Total Awkward Posture		Statistics (X^2)	Significant (p-value)
	Yes N(%)	No N(%)		
More than 1 hour	3	0		
Working days				
≤4 days	6	0		1.000
≥5 days	25	1		
Buddy system				
Yes	30	0		0.062
No	1	1		
Break room provided				
Yes	21	0		0.344
No	10	1		
Poor transport condition				
Yes	24	0		0.250
No	7	1		

However, based on Table 4.10, when conducting Pearson's and Spearman's rho correlation test for the numerical data, age, family members, years of working as police officers, and number of workers with the same job scope have an association with the presence of awkward posture when performing their duty. Age indicates a significant positive relationship with the presence of awkward posture ($r(32) = 0.548$, $p = 0.001$). While family members also have a significant positive relationship with awkward posture ($r(32) = 0.566$, $p = 0.001$). Years of working as police officers also have a positive significant relationship with awkward posture with $r(32) = 0.528$, $p = 0.002$. The number of workers working in the same job scope also has a significantly negative relationship with awkward postures with value $r(32) = -0.532$, $p = 0.002$. The strength

of the relationships is strong as the strange is between either positive or negative 0.50 to 1.00 which means decreased number of workers, high in awkward posture, increased age, family members, and years of working experience, higher in awkward posture. Therefore, these factors only reject the null hypothesis.

Table 4.10: Correlation of REBA scores and risk factors present among Malaysian traffic police (N=32)

Risk factors	Correlation coefficient	P-value
Age	0.548	0.001
Salary	0.244	0.178
Height	0.337	0.060
Weight	0.043	0.816
Family members	0.566	0.001
Medicine intake	-0.229	0.207
Number of cigarettes	0.101	0.581
Activity duration	-0.071	0.700
Average sleep duration	0.212	0.244
Working experience	0.528	0.002
Average working hours	-0.156	0.395
Working days	0.311	0.084
Colleagues with similar job scope	-0.532	0.002

To assess the risk factors that an associated with the presence of MSDs (Table 4.11), a chi-square test for independence was performed. Smoking, hours of sleep, and transport conditions are associated with the presence of MSDs. Of those who smoke 65.4% reported MSDs while 34.6% did not exhibit any MSDs. The chi-square test shows a significant result ($X^2(1) = 3.839$, $p = 0.05$, phi = 0.102), this implies a statistically significant albeit low-sized association between smoking and MSDs. Of

those who sleep for less than 6 hours, 66.0% have MSDs while 34.0% don't. The test shows a significant result ($X^2(1) = 5.277$, p = 0.022, phi = 0. 120). It implies a statistically significant albeit low-sized association between sleeping hours and MSDs. In poor transport conditions, 56.0% reported MSDs as compared to 44.0% doesn't have MSDs. The test showed significant results ($X^2(1) = 6.661$, p = 0.010, phi = -0.135) which implies a statistically significant relationship albeit low sized between transport condition and MSDs.

Table 4.11: Association between Musculoskeletal disorders (MSDs) and risk factors among Malaysian traffic police (N=366)

Variables	Total MSDs		Statistics	Significant
	Yes, N(%)	No, N(%)	(X^2)	(P-value)
Age				
≤35 years old	97 (59.5)	66 (40.5)	0.162	0.687
≥36 years old	125 (61.6)	78 (38.4)		
Marital status				
Single	20 (46.5)	23 (53.5)	N/A	0.095
Married	198 (62.3)	120 (37.7)		
Divorced	4 (80.0)	1 (20.0)		
Education level				
Secondary school	154 (59.5)	105 (40.5)	0.812	0.666
Certificate/Diploma	40 (61.5)	25 (38.1)		
Degree and above	28 (66.7)	14 (33.3)		
Salary				
≤RM2000	61 (65.6)	32 (34.4)	1.273	0.259
≥RM2001	161 (59.0)	112 (41.0)		
BMI				
Normal	71 (59.7)	48 (40.3)	0.073	0.787
Abnormal	151 (61.1)	96 (38.9)		
Family members				
≤3	83 (56.8)	63 (43.2)	1.475	0.225

Table 4.11: Continued

Variables	Total MSDs		Statistics	Significant
	Yes, N(%)	No, N(%)	(X^2)	(P-value)
≥4	139 (63.2)	81 (36.8)		
Medicine intake				
Yes	32 (62.7)	19 (37.3)	0.108	0.742
No	190 (60.3)	125 (39.7)		
Smoking				
Yes	125 (65.4)	66 (34.6)	3.839*	0.050
No	97 (55.4)	78 (44.6)		
Physical activity				
Yes	183 (60.8)	118 (39.2)	0.014	0.905
No	39 (60.0)	26 (40.0)		
Sleep hours				
≤6	132 (66.0)	68 (34.0)	5.277*	0.022
≥7	90 (54.2)	76 (45.8)		
Sleep difficulty				
Yes	50 (66.7)	25 (33.3)		
No	172 (59.1)	119 (40.9)	1.428	0.232
Work history				
Yes	136 (62.4)	82 (37.6)	0.676	0.411
No	86 (58.1)	62 (41.9)		
Working experience				
≤15 years	130 (61.3)	82 (38.7)	0.093	0.760
≥16 years	92 (59.7)	62 (40.3)		
Shift hours				
8	147 (60.0)	98 (40.0)	1.427	0.490
16	14 (73.7)	5 (26.3)		
24	61 (59.8)	41 (40.2)		
Shift type				
Morning	21 (51.2)	20 (48.8)	2.654	0.265
Evening	1 (100.0)	0 (0.0)		
Both	200 (61.7)	124 (38.3)		

Table 4.11: Continued

Variables	Total MSDs		Statistics	Significant
	Yes, N(%)	No, N(%)	(X^2)	(P-value)
Working hours				
≤8 hours	120 (58.8)	84 (41.2)	0.648	0.421
≥9 hours	102 (63.0)	60 (37.0)		
Task duration				
1-4 hours	22 (59.5)	15 (40.5)	3.487	0.322
5-8 hours	125 (58.7)	88 (41.3)		
9-12 hours	48 (60.0)	32 (40.0)		
Others	27 (75.0)	9 (25.0)		
Break time				
30 minutes	86 (59.7)	58 (40.3)	1.151	0.765
60 minutes	94 (63.5)	54 (36.5)		
More than 1 hour	39 (57.4)	29 (42.6)		
Others	3 (50.0)	3 (50.0)		
Working days				
≤4 days	50 (63.3)	29 (36.7)	0.293	0.588
≥5 days	172 (59.9)	115 (40.1)		
Buddy system				
Yes	192 (61.3)	121 (38.7)	0.426	0.514
No	30 (56.6)	23 (43.4)		
Break room provided				
Yes	137 (61.4)	86 (38.6)	0.145	0.703
No	85 (59.4)	58 (40.6)		
Poor transport condition				
Yes	136 (56.0)	107 (44.0)	6.661*	0.010
No	86 (69.9)	37 (30.1)		

*effect size, phi value: smoking = 0.102, sleep hours = 0.120, poor transport condition = -0.135

4.4 Association Between REBA Score and Self-Reported (Musculoskeletal Disorders and Psychosocial Factors)

To associate two categories of variables which are REBA score and MSDS and psychosocial factors, the chi-square test for independence has been performed for 32 respondents and Fisher's exact test has been utilised as the assumptions are violated >20.0%. By looking at Table 4.12 and Table 4.13 that report the chi-square result analysis, none of the factors; MSDs and psychosocial factors are associated with the presence of awkward posture as all of them are not significantly different $p > 0.05$.

Table 4.12: Association between REBA score with MSDs and psychosocial factors in categorical value among Malaysian traffic police (N=32)

Variables	Total Awkward Posture		Statistics	Significant
	Yes, N(%)	No, N(%)	(X^2)	(P-value)
MSDs				
Yes	19 (100.0)	0 (0.0)	N/A	0.406
No	12 (92.3)	1 (7.7)		
Stress				
Yes	27 (96.4)	1 (3.6)	N/A	1.000
No	4 (100.0)	0 (0.0)		

Table 4.13: Association between presence of MSDs and psychosocial factors among Malaysian traffic police (N=32)

Variables	Presence of MSDs		Statistics	Significant
	Yes, N(%)	No, N(%)	(X^2)	(P-value)
Stress				
Yes	18 (64.3)	10 (35.7)	N/A	0.279
No	1 (25.0)	3 (75.0)		

To find out if psychosocial factors and the presence of MSDs are related, a logistic regression analysis was done. Psychosocial factors, the predictor variable, was examined beforehand to make sure the logit's linearity assumption wasn't violated. Table 4.14 presents the results from the logistic regression analysis. B = (-0.675), SE = 0.374, Wald = 3.260, $p < 0.05$ is the unstandardized beta weight for the constant. All factors are significant $p < 0.05$. The odds of the traffic police officers to having MSDs due to overall psychosocial factors are 1.375 times higher than those who did not have MSDs due to psychosocial factors with a 95% CI of 1.122 to 1.686. Work-related have the highest odds 1.392 times higher with a 95% CI of 1.137 to 1.703, followed by organisational, overall, poor management/lack of resources, operational, responsibilities, and social-related.

Table 4.14: Association between psychosocial stressors and the presence of MSDs among Malaysian traffic police (N=366)

Variables	P-value	Odds ratio (RO)	95% CI for OR	
			Lower	Upper
Overall psychosocial stressors	0.002	1.375	1.122	1.686
Operational	0.006	1.330	1.086	1.628
Social-related	0.050	1.200	1.000	1.439
Work-related	0.001	1.392	1.137	1.703
Organisational	0.001	1.378	1.135	1.673
Poor management/lack of resource	0.001	1.365	1.144	1.627
Responsibilities	0.008	1.307	1.071	1.595

CHAPTER 5

DISCUSSION

5.1 Prevalence of MSDs And Psychosocial Factors

In this research, higher prevalence rates of Musculoskeletal Disorders (MSDs) were observed in the neck (45.6%), shoulder (43.2%), and upper back (37.7%) areas, while the lowest rates were recorded in the elbow (13.9%). These findings align with previous research from different countries such as India, which identified neck pain as the most prevalent MSD among police officers (51%), followed by lower back pain (45%) (Pandey & Bindra, 2023). In Brazil, there was reported a 75% prevalence of neck pain, while Nigeria reported 81% of police officers having neck pain (Pandey & Bindra, 2023; Rufai et al., 2019; Da Trindade et al., 2015). Similarly, the prevalence of MSDs reported in Nepal was 87.8%, with 48.3% experiencing neck pain, 56.1% reporting upper back pain and 54.4% lower back pain among traffic police (Jahan et al., 2023; Dhakal et al., 2017). The highest prevalence was observed in the neck and shoulder (35.8%), ensued by the lower back and waist/thigh (34.3%) among traffic police officers in an urban city area (Jamil et al., 2021; Diyana et al., 2019). In Sabah, 96.6% of traffic police officers reported musculoskeletal discomfort, with 26.3% experiencing discomfort in the neck/shoulder, 14.5% in the hand/finger, 16.8% in the arm, 30.1% in the mid to lower back, and 29% in the hips/back and calves/legs (Thien et al., 2022). Conversely, different studies in Sweden found low back pain as amongst the commonly reported MSD among police officers, although neck, shoulders, arms, and lower extremities were also prevalent (Berner et al., 2024; Cho et al. 2014; Ramstrand & Larsen, 2012).

Similarly, the current study also corresponds with other occupational demographics outside of traffic police, whereby in Estonia, 44.7% of office workers reported having musculoskeletal issues that affected at least one of the four body parts which are low back, shoulder, neck, and wrist/hand. The most often reported pain locations were headache, lower back pain, and neck discomfort (Ataguba & Orji, 2024; Borhany et al., 2018). Contrary to a research from Larsen et al. (2018) where they claimed Swedish police officers experienced higher rates contrasted to the general working population (Larsen et al., 2018). They found that the police officers had a multisite prevalence of 41.3% and single-site pain of 19.7%, with upper back or neck pain (33.7%), lower back pain (43.2%), shoulder or arm pain (25.5%), and hip, leg, knee, or foot pain (38.0%) (Larsen et al., 2018). These findings indicate the high percentage of pain in lower back sparks concern as they have considerable impacts on individuals, including taken work leave, activity restrictions, and notable financial burdens for community (Reis et al., 2024; Hoy et al., 2010). Thus, Larsen et al. (2018) emphasized that addressing musculoskeletal discomfort have to be a priority among the Swedish police force. This emphasis should be applied to the current study population as well.

Contradicting to the current study findings, in Pakistan, traffic police reported low back pain (43%) to be the highest prevalent body parts in pain, further ensues in the neck region (31%), upper back (26%), shoulder (21%), knee (18%), ankle (13%), and wrist (7%) (Naz et al., 2022). In Lahore, Fiaz et al. (2018) also corresponds by finding that the shoulder amongst the frequent prevalently reported region of discomfort in the upper extremity. They contradict their findings from Naz et al. (2022) in a way that leg pain (38.8%) was documented as the most common MSDs, followed by low back pain (38.1%) when the latter reported pain at the lower back region (43%) are commonly frequent (Naz et al., 2022; Fiaz et al., 2018). Fiaz et al. (2018) further

reported the lowest was in the upper back (4.5%) where most participants reported moderate pain (61.2%), followed by mild pain (20.1%), and severe pain (18.7%) (Fiaz et al., 2018). Variation of discoveries across countries can be linked from the various factors influencing police work, for instance, general aspects such as managerial structure, organisational policies, job roles, levels of job control, available social support, and job rank (Mohamed et al., 2021; Carvalho et al., 2008; Wiese et al., 2003). Additionally, different body muscles and working conditions among police officers may cause varying patterns of pain (Tavares et al., 2020; Diyana et al., 2019). Cultural differences may also be the cause of contradictory results. Social orientations and stress management strategies differ between Eastern and Western cultures (Han et al., 2022). People in Western cultures, such those of North Americans of European heritage, tend to adopt autonomous social orientations that emphasize independence, self-determination, and self-expression. They frequently see themselves as distinct from other people. Eastern Asians, such as Chinese, Japanese, and Koreans, on the other hand, tend to embrace interdependent social orientations that emphasize harmony and connectivity, seeing themselves as interconnected through relationships.

The explanation for the neck pain as being the most prevalent in this study is evident from a research performed by Todd et al. (2007) where they have shown the neck pain emerges as the predominant issue among traffic police officers, with a prevalence of 51%, closely trailed by pain at lower back at 45%. It is because, the delicate structure of the neck led to an individual particularly prone to stress and strain, often resulting in pain and discomfort. Contributing to this, poor posture from practicing a prolonged period of sitting with a slouching or forward head position, exerts undue pressure on the neck's muscles and ligaments, resulting in tension and imbalances of the muscle that leads to having pain in the neck (Pandey & Bindra, 2023; Todd et al., 2007). At

the same time, various factors including age, working conditions, body type, hypertension, diabetes, years of service, and physical stress contribute to the occurrence of musculoskeletal problems among traffic police officers (Dhakal et al., 2017). Ergonomic risk factors for instances, standing for a long time, uncomfortable postures, heavy lifting, and repetitive hand movements exacerbate the risk of musculoskeletal issues (Jahan et al., 2023; Dhakal et al., 2017). This later proven where Nigerian police officers notably recorded pain at lower extremities as the most common discomfort, affecting 74.1% of individuals, with prolonged static positions being identified as the main risk factor for Work-Related Musculoskeletal Disorders (WMSDs) (Pandey & Bindra, 2023; Rufai et al., 2019).

A study by Diyana et al. (2019) has been further explained where the significant prevalence of shoulder and neck pain among traffic police officers, potentially attributed to the body posture involved in motorcycle riding duties. The standard riding posture of motorcycles like the CBX 750 can induce shoulder injuries, pain, and thoracic outlet syndrome due to prolonged over-reached postures (Arunachalam et al., 2021; Andrew, 2010). Moreover, wearing a helmet adds substantial weight to the head, requiring considerable neck support, thereby increasing the likelihood of neck muscle problems that indirectly affect the shoulder region (Siyeon & Wonyoung, 2020; Weng, 2001). Mahmoud et al., (2019) further agree by gathering the links between neck pain to increased forward head posture. Naturally, repeatedly lifting heavy motorcycles like the CBX 750 during parking duties was identified as a likely cause of neck and shoulder pain among officers (Samad et al., 2022; Diyana et al., 2019). Mainly because the neck supports the head and bending the neck can cause the head barely supporting the spine. To keep the bent head posture, the small spinal muscles holds twice the force as they normally do. Plenty of force will be applied to the neck muscles to maintain

head stability in this posture. Consequently, it overburdened causing injuries (Demissie et al., 2024; Harrison et al., 2001). This heavy workload can lead to work-related musculoskeletal disorders, prompting sick leave in some cases (Samad et al., 2022; Douma et al., 2019; Brown, 1998). Additionally, when performing traffic policing duty, the centre of gravity during standing shifts to the hip and waist area, leading to fatigue and strain on the muscles, resulting in an increased prevalence of musculoskeletal issues in these regions (Gumasing et al., 2023; Phadke et al., 2015; Gyi & Porter, 1998). It's important to note that musculoskeletal disorders not only impose significant costs on society but also diminish productivity and contribute to illness and disability (Dong et al., 2020; Joshipura & Gosselin, 2020; Blyth et al., 2019; Williams et al., 2018).

The outcomes from a study conducted in Pakistan with 69% of police had upper extremity pain believed the cause was due to long working hours; they work for more than 11 hours a day. This leads to the police officers felt worn out after performing their duties (Samad et al., 2022; Ghanea Ahmad et al., 2018). The presence of fatigue subsequently causing the strained muscles to not have sufficient time to recover (Gumasing et al., 2023; Paudel et al., 2018; Sofat & Keat, 2002). In the case of executing the task involving the upper body such as during traffic management, it requires extended upper limb exposures or flexed and abducted postures that raise cumulative shoulder moments (Dupuis et al., 2021). These episodes later led to higher muscle loads which raised the possibility of upper limb pain and localised muscular fatigue (Dupuis et al., 2021; Sood et al., 2017; Nussbaum, 2001). The risks of having MSDs further exacerbates by practicing body postures and joints deviates from neutral position when executing their duties as the muscles have less capability to apply force (Diyana et al., 2020; Paudel et al., 2018; Sofat & Keat, 2002). The contribution of job

stress towards the occurrence of upper musculoskeletal back pain among nurses, conducted by Zare et al. (2021), has also been noted apart from the previous causes mentioned. This occurs when a physically demanding job duties causes the muscle tension to form, stress slows the recovery of inflammation condition or lowers the muscle's pain threshold (Gumasing et al., 2023; Fortune et al., 2018).

Based on the idea of psychosocial factors, this current research found that the severity of stress among the psychosocial stressors (overall operational mean = 3.43, organisational mean = 3.60) are different in findings from prior studies such as Violanti and Aron (1994), who surveyed 103 of police officers (Taylor & Bennell, 2006). According to their findings, the most stressful operational stressors were thought to be traumatic ones. The events that ranked top on the stressor hierarchy were killing someone while performing official duties, witnessing the death of a colleague, and getting into a physical confrontation.

However, the results in this research are similar to the Ontario Police Department study that identified three of the highest operational stressors out of a possible 7-point rating, which were fatigue, inadequate allotment for family and friends, and work in shifts (Taylor & Bennell, 2006). Conversely, the lowest ranked stressors included aspects such as socializing outside of work job, solo night shift, and the risk of on-the-job injuries. The overall mean operational stress ranking was calculated as 3.33 out of 7.00 which is more prominent compared to organisational stress (Taylor & Bennell, 2006).

Furthermore, their study revealed three of the prevalent organisational stressors within the range of 7 rating, which was the perception of differential treatment, the constant need to prove oneself to the organisation, and an irregular leadership style (Taylor &

Bennell, 2006). In contrary, the least stressful organisational factors included internal investigations, the perception of being looked down upon when sick or injured, and inadequate training on new equipment. The overall mean organisational stress ranking was calculated as 3.55 out of 7.00 (Taylor & Bennell, 2006).

These findings can be linked with the shift work which is a system that was used to manage traffic police officers working hours. However, shift work can lead to fatigue because officers are working long hours under pressure and with an enormous workload with insufficient time for recovery (Boivin et al., 2022; Sadeghniiat-Haghighi & Yazdi, 2015). Mainly because their task can be taxing and incapacitating due to their continual surveillance and frequent exposure to unpleasant and stressful situations (Alves et al., 2023; Waters & Ussery, 2007). It has been found that officers working the night shift are more likely to exhibit lane deviation due to fatigue compared to officers on the day shift (Boivin et al., 2022; James & Vila, 2015).

Burnout can result from a persistently unchangeable work schedule and pressures placed on work-family relations (Alves et al., 2023; Kumar & Kamalanabhan, 2017). Those who work long shifts and get less sleep at night are more likely to develop burnouts because they are constantly exhausted and sleep deprived while on the job (James et al., 2024; Vila, 2006). This occurs when shift work interferes with circadian rhythms, impairs sleep quality, and disturbs social and familial relationships, all of which can contribute to feelings of exhaustion and fatigue (Boivin et al., 2022; Violanti et al., 2017). Melatonin secretion, which triggers the start of sleep, is largely influenced by circadian rhythm, and it has been demonstrated that sleep deprivation causes mood swings, cognitive decline, and irregular hormone cycles (Boivin et al., 2022; Keijzer et al., 2014; Wilson & Nutt, 2013). Moreover, studies have shown that workers with

sleep problems have higher absenteeism incidence rates than those without these conditions (Kagan et al., 2021; Hui & Grandner, 2015).

Staff shortages may also have an impact on traffic police officers in the sense of poor management in the workplace. If it persists, police departments may have to increased officer's workload, downsized from two-officer units to one-officer units, mandated overtime, shelved special assignments to meet patrol requirements, and decreased response time due to a lack of staffing (Bryan & Poole, 2021; McCabe, 2013). Officers may be indirectly affected by staff shortages if they are given an excessive workload, which can lead to job dissatisfaction at work (Hilal & Litsey, 2020). They further shown that workloads burden from shift work deplete valuable resources like time, energy, and emotions, that are necessary to fulfil commitments to family members.

Other causes of psychological distress among police officers should be also taken into consideration, including staff shortages, frequent changes in policy or legislation, limited resources, overly critical leadership styles, and inadequate equipment (Mamat et al., 2022; Rasdi, 2018). Similarly, Paudel et al. (2018) indicated that traffic police officers experience psychological stress because of the demanding nature of their work, long duty hours, dealing with traffic congestion, and repetitive tasks. Considering these factors, it's highly probable that traffic police officers may also be at risk for cardiovascular disorders (Jahan et al., 2023; Tamura et al., 2003; Karita et al., 2001).

Furthermore, as a result of constant exposure to stressors, research by Dhaka et al. (2017) has highlighted a notable prevalence of stress among police officers. Referring to findings from the PHQ-9 Questionnaire, 58.8% of respondents were identified as

experiencing some form of depression, with complaints of tearful eyes or burning reported by 72.3% of individuals (Yadav et al., 2022; Dhakal et al., 2017). Specifically, within the traffic police officers in Kathmandu, Nepal, 124 (41.3%) exhibited symptoms of depression, 141 (47%) displayed signs of anxiety, and 132 (44%) showed indications of stress (Yadav et al., 2022).

Moreover, the concerning part was due to a significant association present between longer hours of working and higher odds of having symptoms of stress, anxiety, and depression (Yadav et al., 2022). Additionally, inadequate of physical exercise was linked to an increased probability of showing depressive symptoms. The fact that the respondents in this research tended to utilize positive coping strategies more frequently than negative coping methods could also be a varying factor that leads to the aforementioned results (Yadav et al., 2022).

In our country, the notable prevalence of psychosocial stressors should be alarming since a recent research required a larger sample size (N = 579) of Kuala Lumpur's police officers has shown the total prevalence of stress to be 38.8%, with severe (5.9%), moderate (14.9%), and mild (18.0%) stress levels (Mohamed et al., 2021; Masilamani et al., 2013). No doubt that one of the factors that contributes to these numbers are due to that law enforcement agencies worldwide are recognized as highly stressful environments, with policing being among the most mentally demanding occupations (Stogner et al., 2020; Violanti et al., 2016; McCraty & Atkinson, 2012; Hartley et al., 2011). This is further attributed to factors such as lengthy and frequently rotating shifts, the constant threat of violence, the requirement for heightened vigilance, and a perceived inadequate support from the public, all of which contribute to chronic stress. Researches related to occupational stress consistently demonstrates

that police officers are regularly prone to both chronic and acute stressful situations in the line of duty, which can have detrimental effects on their physical health and psychological well-being (Acquadro Maran, 2023; Magnavita & Garbarino, 2013; Lucas et al., 2012).

Given that police officers in Malaysia are entrusted with firearms and bestowed with a particular level of authority, it becomes critical to assure that such power and potentially dangerous weapons can only wielded by mentally and psychologically capable individuals (Richards et al., 2021; Irniza & Saliluddin, 2015). Therefore, understanding the mental and psychological status of police officers is essential for making informed decisions aimed at safeguarding the optimal health of Malaysian law enforcement personnel. Maintaining good health among officers can help minimize errors in judgment, instances of violence, abuse of power, misconduct, corruption, and other adverse health-related outcomes.

In assessing the various factors influencing police work, it is essential to consider general aspects such as managerial structure, organisational policies, job roles, levels of job control, job rank, and available social support (Mohamed et al., 2021; Carvalho et al., 2008; Wiese et al., 2003). However, police duty entails unique challenges not encountered in most other occupations, including exposure to traumatic events, being the subject of internal affairs investigations, irregular shift work, courtroom appearances, and the constant threat of injury or death (Han & Yoon, 2024; Mona et al., 2019; Papazoglou & Tuttle, 2018). These factors significantly contribute to the distinctive stressors experienced by police officers and must be carefully managed to promote their overall well-being and effectiveness in their roles.

5.2 Potential Awkward Posture

The current findings have shown the tasks performed by the traffic police officers are considered as awkward postures where the majority of the task (5 out of 6 tasks) fall in the medium category. This happens due to their nature of work by acknowledging Rufai et al. (2019) about the risk factors for Work-related Musculoskeletal Disorders (WMSDs), where 56.6% of the respondents have shown the most prevalent risk factor is "working in the same position for a long period", while 109 (53.2%) reported “working in cramped or awkward positions” as the second most common risk factor. Additionally, Carrying, lifting, or moving heavy materials (such as bulletproof vests or guns) was identified as the least common risk factor, reported by 60 (29.3%) participants (Samad et al., 2022; Rufai et al., 2019). Hence, it could be seen from their study where 39.0% of police officers developed WMSDs in a span of 2 to 5 years of starting their policing careers (Rufai et al., 2019). Furthermore, a significant majority of police officers that accounts 82,9% of them had never received ergonomic training specifically related to WMSDs. It is beyond question that receiving ergonomic training is crucial in training the workers to an appropriate posture when performing their tasks. The awkward posture further exacerbates the presence of MSDs by donning their working gear. A study found a highly significant correlation between multi-site musculoskeletal pain and the discomfort of wearing required equipment among Swedish police (Berner et al., 2024; Larsen et al., 2018). Specifically, discomfort from duty belts was correlated with a significantly higher odds ratio, as was discomfort from body armour.

Similar deductions have been proven by other studies. Studies on musculoskeletal disorders among police have predominantly focused on two main approaches:

biomechanical investigations into load carriage designs and self-reports of discomfort and pain (Berner et al., 2024; Larsen et al. 2016; Ramstrand et al. 2016; Nabeel et al. 2007; Gyi and Porter 1998). These studies have highlighted several factors contributing to musculoskeletal disorders among police personnel, including discomfort from donning mandatory equipment like body armour and duty belts, prolonged periods of sitting in fleet vehicles, and inadequate physical activity and fitness levels (Berner et al., 2024; Ramstrand et al. 2016; Filtness et al. 2014; Holmes et al. 2013; Nabeel et al. 2007; Gyi and Porter 1998).

Since police officers are required to wear duty belts and body armour throughout their duty hours, minimizing discomfort and adverse effects related to the usage is crucial. Discomfort from donning mandatory equipment has been observed throughout various activities, including standing, sitting in fleet vehicles, and walking, with the backrest bolster in standard police vehicles causing the greatest discomfort (Berner et al., 2024; Ramstrand et al. 2016; Filtness et al. 2014; Ramstrand & Larsen 2012). Additionally, the design of load carriage systems has been identified as a significant factor affecting comfort, with standard-issued duty belts creating more discomfort compared to load-bearing vests (Berner et al., 2024; Filtness et al. 2014). Gyi and Porter (1998) agreed that the use of equipment like protective vests and duty belts alters optimal sitting posture and leads to discomfort in the shoulders, wrists, and hands (Berner et al., 2024). The impact of MSDs is further exacerbated by physical risk factors, which include working in non-neutral body positions, heavy lifting, fast work speed with limited rest time, whole-body or segmental vibration, repetitive movement patterns, and static muscular stress (Dey et al., 2023; Punnett & Wegman 2004).

In the case of traffic police officers that requires riding motorcycles on duty, the discomfort experienced by male motorcyclists primarily affects their buttocks and upper body parts and is linked to their riding posture, which raises concerns about the compatibility between the rider and the motorcycle (Arunachalam et al., 2021; Karmegam et al., 2013). Riding experience significantly contributes to discomfort symptoms in various body parts, including the upper back, arms/hands, and lower back. Jamil et al. (2021) further added that the musculoskeletal demands arise from prolonged motorcycle use, often with old and high-powered motorcycles, resulting in awkward postures and long riding hours, leading to discomfort and work-related musculoskeletal disorders (WMSDs). Ergonomically, motorcycles within the Malaysian market lack design considerations, contributing to discomfort.

Furthermore, musculoskeletal pain during riding can be attributed to physical fatigue in specific muscle groups and non-uniform seat pressure distribution, resulting from prolonged sitting postures required for motorcycle riding (Jo et al., 2021; Balasubramanian & Jagannath, 2014). Problems such as lower back pain are exacerbated by prolonged driving and sitting, particularly in occupations like policing where officers engage in physically demanding activities and prolonged driving/sitting periods (Sany et al., 2021; Lis et al. 2007; Porter & Gyi 2002; Gyi & Porter 1998). Additionally, excessive motorcycle riding can exert compressive forces on the spine, accelerating degenerative changes in intervertebral discs because of whole-body vibration (Jain A R Tony et al., 2020; Phadke et al., 2015). The upper back is another commonly affected region, attributed to repetitive muscle contractions, particularly during peak traffic hours. Moreover, the static nature of their duty increases their vulnerability to ergonomic hazards, exacerbated by traffic congestion in many cities.

A study in Manila using REBA then discovered that 84.2% of traffic officers had a medium risk of MSDs, while 15.8% had a high risk because of their awkward and sedentary posture (Gumasing et al., 2023). It was shown that there was a greater likelihood of complaints regarding MSD symptoms among traffic officers with bad working posture (OR = 4.61, 95% CI = 2.167, 9.83). Additionally, their investigation revealed a stronger correlation between MSD symptoms and traffic officers who are standing and use arm gestures. This is because, when a joint is in the middle of its range of motion, it is most efficient. The risk of MSDs rises when joints are operated outside of this mid-range often or for prolonged periods of time without adequate time for recovery (Gumasing et al., 2023). Awkward posture, such as extended arm overreach similar to posture during arm signal, can result in thoracic outlet syndrome, which can lead to neck and shoulder muscle fatigue, as well as shoulder injuries and pain (Gumasing et al., 2023; Diyana et al., 2019).

For traffic police officers, the predominant working posture is standing which adds to the problem, causing fatigue in the hip muscles and resulting in lumbar strain and back pain (Jamil et al., 2021). This posture results in the centre of gravity commonly in the hip and waist area during standing (Naz et al., 2022). Prolonged standing leads to fatigue in the hip muscles, causing the lower back to assume a severely arched position and leading to back pain and lumbar strain (Samad et al., 2022; Phadke et al., 2015; Phadke et al., 2014). Back pain among traffic police officers can also stem from reduced efficiency of the base of support, especially during prolonged standing, leading to tensed feet and muscle contractions (Choi et al., 2022; Phadke et al., 2015). Initially, individuals experience fatigue, which surpasses their body's recovery

capacity (Gumasing et al., 2023; Phadke et al., 2015). This leads to musculoskeletal imbalances, gradually progressing to disorders over time.

The impact of having Musculoskeletal Disorders (MSDs) has been shown by various studies. MSDs can pose significant challenges globally, leading to pain, disability, absenteeism, reduced productivity, and substantial financial burdens (Reis et al., 2024; Stewart et al., 2003). Police officers are particularly susceptible to MSDs due to the diverse nature of their duties, involving tasks like traffic control, driving, security, sports, handling heavy equipment, and responding to emergencies (Pandey & Bindra, 2023). These disorders encompass various issues such as sprains, bursitis, tendinitis, ligament injuries, nerve entrapment, and bone and cartilage damage (Ahmed et al., 2023; Kim & Lee, 2008). Repetitive and excessive movement can lead to inflammation and swelling between tendons and sheaths, resulting in tendonitis (Ahmed et al., 2023; Paudel et al., 2018). Awkward postures and repetitive motions further expose tendons, leading to thickening and inflammation. This can manifest as muscle weakness, numbness, fatigue, discomfort, and foot problems like varicose veins (Canadian Centre for Occupational Health & Safety, 2014). Additionally, the irregular work schedules of policemen, which often involve night shifts and emergencies, disrupt their circadian rhythm, making it difficult to maintain a regular lifestyle compared to other professions (Pandey & Bindra, 2023). Prolonged standing can also impede blood circulation, accelerating fatigue and increasing the risk of injury as muscles required to support the trunk, neck and shoulders in a fixed position while standing for a long period (Tang, 2020; Paudel et al., 2018; European Agency for Safety and Health at Work, 2007).

5.3 Association Between REBA Score and Risk Factors (Sociodemographic Characteristics, Lifestyle, And Occupational Factors)

The current findings found that age, family members, years of working, and number of workers with the same job scope are associated with awkward posture among police officers, while smoking, hours of sleep, and transport conditions were linked with the prevalence of Musculoskeletal Disorders (MSDs). These results vary from previous studies. A study identified significant differences in the 12-month prevalence of work-related musculoskeletal disorders (WMSDs) on police officers based on various demographic and occupational factors (He et al., 2023; Rufai et al., 2019). These factors included age groups, years of working experience, and daily hours spent at work. However, there was no statistically significant difference in WMSD prevalence based on gender, job category, marital status, rank, educational level, or body mass index (BMI). The prevalence of WMSDs was higher among older age groups, participants with longer working experience, and those who worked for more than 12 hours per day. Additionally, males had a higher prevalence compared to females, and overweight participants recorded a higher prevalence of WMSDs (He et al., 2023; Rufai et al., 2019). Notwithstanding the previous findings, factors that includes age, longer working hours per day, work experience, prolonged seated posture, and daily alcohol consumption were significantly associated with the 12-month prevalence of WMSDs among Fatehgarh Sahib and Patiala District police officers (Pandey & Bindra, 2023). However, they also found that lifestyle factors like smoking, exercise, and sleep disorders were not significant contributors to WMSD prevalence. Similarly, Thien et al. (2022) also found no significant relationship between the prevalence of MSDs and gender. Another study found that prolonged sitting in fleet vehicles and shift work were characteristic workload factors for police officers, contributing to WMSDs

(Pandey & Bindra, 2023; Larsen et al., 2018). Meanwhile, 70% of participants reported having multi-site musculoskeletal pain as a result of wearing body armour and duty belts (Berner et al., 2024; Larsen et al., 2018). Furthermore, factors such as riding duration, long period of service as a traffic police rider, and exposure to hand-arm vibration (HAV) were significantly correlated with WMSDs among traffic police officers (Nurkertamanda et al., 2025; Diyana et al., 2019). A research by Feng et al. (2014) has linked prolonged working hours to work-related musculoskeletal disorders (WMSDs) (Pleho et al., 2021).

Previous researches on the effects of smoking on skeletal muscles showed solid evidence that smoking was linked to negative consequences, including reduced muscle strength which was strongly correlated with a reduction in grip strength, knee muscle strength, and back extensor muscle strength (Wang et al., 2022; Al-Sayegh et al., 2014; Kok et al., 2012; Adedoyin et al., 2010). When smokers and non-smokers were compared, it was shown that smokers had lower mean concentrations of bone marrow progenitor cells (BMPCs) and lower periosteal gene expression of bone morphogenetic proteins (BMP) (Pandey et al., 2021; Beyth et al., 2015; Chassanidis et al., 2012). It takes both BMP and BMPCs to promote musculoskeletal regeneration and repair (Al-Bashaireh et al., 2018). Essentially, the most well-known adverse effects are basically the decrease in bone mineral content and the rise in fracture frequency (Tarantino et al., 2021; Abate et al., 2013). The most widely accepted theories explaining the link between smoking and disc degeneration are based on experimental observations that involves the increased collagen degradation, adverse toxic activity of nicotine, decreased blood and oxygen supply due to vascular damage, and/or vasoconstriction of the vascular network surrounding the intervertebral discs (Tarantino et al., 2021; Abate et al., 2013; Rom et al., 2012).

Officers' hours of sleep may have an impact on the development of MSDs since insufficient sleep can make pain worse and pain might interfere with a restful night (Sun et al., 2021; Skarpsno et al., 2020). People who slept for nine hours or longer each night, or for less than six hours, seemed to indicate experiencing pain more often the next day (Lücke et al., 2023; Edwards et al., 2008). Sleep deprivation may be associated with heightened sensitivity to noxious stimuli and reduced endogenous pain-inhibitory processes (Kourbanova et al., 2022; Kundermann et al., 2004). In fact, there is a strong correlation between prolonged sleep and elevated inflammation (Palsson et al., 2023).

Officers on traffic enforcement duty may operate vehicles that produce vibrations, potentially exposing them to whole body vibration (WBV) (Niazmand-Aghdam et al., 2021). Vibration exposure at work has been linked to a higher incidence of musculoskeletal pain in the hands, shoulders, hips, back, and neck (Diyana et al., 2020; Krajnak, 2018). A motor's vibration levels may gradually rise with age. The circumstances of the car itself could be the primary cause of the levels rising over time, among many other factors that are related to poor transport condition (Ágoston, 2020).

Similar studies in other occupational settings reported a different result compared to traffic police. Studies such as from a software company in Kolkata and China, have reported high prevalence rates of musculoskeletal symptoms, specifically in the upper extremities, associated with factors like increased workload and psychological stress (Soares et al., 2020; Basu et al, 2014; Cho et al., 2012). Meanwhile, factors associated with chronic neck and shoulder pain in public hospital workers include workload such as long work hours per week, ergonomic factors such as bending and twisting the neck

for extended periods, and computer-related factors such as prolonged computer use and improper keyboard placement (Dong et al., 2020). The differences in results across occupational settings could be attributed to the physically demanding nature of operational tasks, which is commonly associated with musculoskeletal disorders (Greggi et al., 2024; Telaprolu & Anne, 2014). Although there wasn't a significant variation in the prevalence of WMSDs among job categories, individuals in operational roles exhibited the highest prevalence (Rufai et al, 2019). Similarly, while there wasn't a notable difference in MSDs prevalence based on rank, a majority of inspectors (88.9%) reported experiencing MSDs. This might be due to the correlation between higher ranks and longer years of service, with most inspectors in the study having extensive work experience, which could contribute to WMSD prevalence (Njaka et al., 2021; Rufai et al, 2019). Another study also indicated that the duration of service correlates positively with musculoskeletal pain symptoms (Njaka et al., 2021; Hussain, 2004).

Musculoskeletal disorders (MSDs) have a notable effect on various aspects of health and work, including disability, sickness absence, and work ability (Feitosa et al., 2020; Neupane et al. 2015; Larsen et al., 2018). Numerous studies have highlighted the adverse effects of musculoskeletal disorders on police officers, emphasizing the importance of further research in this area. These disorders not only affect individual officers' well-being but also have broader implications for workforce productivity and healthcare utilization. To address the physical demands of police work, Swedish police officers are allocated one hour of weekly physical exercise inside paid working hours (Larsen et al., 2018). Overall, large-scale studies researching the prevalence of musculoskeletal disorders on police officers are scarce, despite the widely acknowledged perception of this occupational group being at a heightened risk. While

previous studies have primarily focused on risk factors for the initial onset of musculoskeletal disorders (MSDs), which tend to be short-term and self-limiting, such as acute low back pain resolving within weeks, there's a scarcity of evidence concerning risk factors for chronic MSDs (Dong et al., 2020).

5.4 Association Between REBA Score and Self-Reported (Musculoskeletal Disorders and Psychosocial Factors)

Both operational and organisational stressors were found to be associated with MSDs whilst not associated with awkward posture. Musculoskeletal disorders (MSDs) were analyzed because the intended outcome of the REBA score indicates the presence of awkward postures, which can eventually lead to MSDs (Boyd, 2021; Hignett & McAtamney, 2000). The associations between psychosocial factors and MSDs among police officers have been addressed by previous studies in various countries. Factors such as job satisfaction and repeated post-traumatic treatments (psychological assistance) after facing a challenging circumstance at work are linked with the presence of low back pain among Quebec police officers (Douma et al., 2019). This happens due to police officers having insufficient rest between shifts due to their working arrangements that require them to work overtime (Granholm Valmari et al., 2022; Ramstrand & Larsen, 2012). Burton et al. (1996) further added that wearing a body armour when driving affects job satisfaction among police officers by slightly increasing satisfaction in their job. Another study among Korean police officers found that working multiple shift schedules, standby for emergencies, investigation and patrol duties were causing them to have lumbar spine disorders (Pandey & Bindra, 2023; Rhee et al., 2015). In fact, having poor control in their work and low social support could also linked to MSDs on police officers (Anwer et al., 2021; Larsen et al., 2019). Similarly, Gershon et al. (2002) suggested the presence of a lack of

cooperation, workplace inequalities, and poor organisational structure correlates to the occurrence of chronic back pain and foot problems. In the context of home-work interference, parenthood could be seen as affecting on firefighters and police officers in Ontario, Canada by causing back pain (Finkelstein, 1995). It was reported that 33% of the officers had back pain and the risk increases as the number of children increases. Personal factors like marital status and having children intermittently relate to police stress, with social support potentially aiding stress management, although balancing job demands with family responsibilities can increase stress (Galanis et al., 2021; Taylor & Bennell, 2006).

According to a study among Iranian office workers, overall fatigue was linked to the degree of musculoskeletal discomfort or pain in the neck, shoulders, lower back, and thighs (Arman et al., 2022; Daneshmandi et al., 2017). Employees may become fatigued at work because they are stressed at work, and stress is a result of fatigued work (Kisi & Kayastha, 2024). Moreover, prior research has demonstrated that maintaining an awkward and static posture for extended periods of time while working may result in discomfort, pain, and chronic fatigue (Jo et al., 2021; McNee et al., 2013). The brain controls fatigue centrally (Yogisutanti et al., 2022). Psychoneuroimmunology theory states that stress stimulates the hypothalamus, which in turn stimulates the pituitary, which in turn creates the adrenaline hormone ACTH, which is the precursor to cortisol (Yogisutanti et al., 2022). When stress levels are extremely high, cortisol is created in large quantities, which exacerbates physical symptoms by weakening the immune system (Mariadnyani et al., 2020).

Stress increases both the likelihood of psychological disorder symptoms emerging and the state of a person's physical wellness (Yogisutanti et al., 2022). Muscle tenseness is

the body's instinctive response to stress and a defence mechanism against disease and injury (Yogisutanti et al., 2020). Human bodies are made to move and are not meant to remain still hence, the risk of having MSDs could occur when muscles are used in a fixed position without having a chance to relax, which lowers blood flow (Etana et al., 2021; Luttmann et al., 2003). Moreover, prolonged periods of time spent in the same position increase the muscle load and activity surrounding the facet joint, resulting in joint compression and musculoskeletal system symptoms (Soares et al., 2020; Ozvurmaz & Mandiracioglu, 2017). Additionally, MSDs and rest were substantially correlated (Kasaw Kibret et al., 2020). This happen when people take pauses from their work, they are more likely to relax their muscles, allowing them to rest, heal, and feel less sore.

Similar to the current findings, organisational stressors typically cause more stress than operational ones among police officers, with certain stressors like perceived inequality ranking higher than traumatic events (Mamat et al., 2022; Taylor & Bennell, 2006). Moreover, certain occupational factors like shift work and extended seated postures are associated with musculoskeletal disorders among police officers, highlighting the physical toll of police work (Pandey & Bindra, 2023). Additionally, urban traffic police officers may face unique stressors compared to their rural counterparts, such as increased traffic congestion, air pollution, and crime rates (Wu & Wen, 2020; Irniza & Saliluddin, 2015). Interestingly, the prevalence of stress among traffic police officers in Kathmandu appears higher as opposed to general police officers in other countries, possibly due to the harsh working conditions and lack of mental health services (Yadav et al., 2022).

The differences present in prevalence rates across studies may be connected to variations in study tools, working environments, and availability of mental health services. In some cases, a specific group of officers comprises individuals with stress-resistant personality traits such as hardiness or who have cultivated adaptive coping skills (Queirós et al., 2020; Taylor & Bennell, 2006). Furthermore, Malaysian police officers must pass physical and psychological health tests before starting their careers (Unit of Employee Recruitments, 2009). However, to address mental health and well-being concerns, the Bahagian Agama dan Kaunseling (BAKA), or the Section of Counseling and Religion, was established (Rasdi et al., 2020; Royal Malaysian Police, 2010). BAKA offers counselling, religious guidance specifically for Muslims, short courses, training, seminars, and workshops for officers. Notably, spiritual support is only available for Muslim officers.

5.5 Developing Ergonomic Module

In developing the educational ergonomic module for the traffic police based on the current findings, some aspects can be applied in this module for a more comprehensive approach to address the issues. It requires a systematic process to produce reliable and quality outcome. The module's aspects should also be suited to the targeted learner's understanding to effectively relay the information (Liu & Li, 2022; Scott et al., 2014; Barbosa & Maldonado, 2006). The educational modules themselves should be evolvable, reusable and adaptable to different learning scenarios and objectives. Thereby, accomplishing the goal of Sustainable Development Goals (SDG) 3 Good Health and Wellbeing for Royal Malaysian Police. This module draws inspiration from the existing module in United States, Ergonomics for General Industry Workplace Program, developed by the Texas Department of Insurance. Its simplicity in presenting

content serves as a model for this module. We have chosen to reference a program from a Western country rather than one from Asia because the Global Burden of Disease Study 2021 indicates that low back pain is the most significant health issue in Canada (part of high-income North America), while stroke remains the most burdensome health concern in all regions of East Asia (Ferrari et al., 2024). This highlights that Western countries have developed a mature framework to address these health challenges.

Two main criteria that must be included in the proposed ergonomic module are risk factors and mitigation strategies. These criteria are essential for addressing the specific needs of Malaysian traffic police officers in preventing musculoskeletal disorders (MSDs). They are based on significant findings from the current research, specifically from objectives 1 to 4. The research identified eight risk factors associated with traffic police officers: age, working posture, family background, colleagues with similar job roles, smoking habits, sleep conditions, transportation conditions, and working experience. In response to these risk factors, we will develop mitigation strategies tailored specifically for Malaysian traffic police officers. These strategies will include scheduled breaks, light stretching exercises, health check-ups, and ergonomics training.

The suggested aspects focused on in this module are factors contributing to awkward postures, understanding the prevalent musculoskeletal disorders (MSDs), ergonomic training for task execution, and continuous monitoring and evaluation. The data from recent research can be integrated and analysed in developing the module to get a comprehensive module (Liu & Li, 2022; Farid et al., 2015; Barbosa & Maldonado, 2006). The findings and analysis must be thoroughly discussed and analysed by related

experts for evaluation. For continuous improvement, regularly monitor the effectiveness of ergonomic interventions and stress management programs through feedback mechanisms and assessments. Adjust strategies as needed to ensure the optimal health and well-being of traffic police officers such as collecting feedback from officers to assess the impact of interventions on reducing MSDs. Then, modify and refine the ergonomic module based on feedback and emerging research findings to ensure its continued effectiveness. By implementing the strategies outlined in this module, police agencies can promote a healthier and more productive workforce, ultimately enhancing the well-being and performance of their personnel.

The findings of this research differ from previous studies, such as Douma et al. (2019), which focused on Quebec police officers. This study takes a more dynamic approach by examining various body parts involved in body pain that can lead to musculoskeletal disorders (MSDs), using the Nordic Musculoskeletal Questionnaire (NMQ) to measure discomfort across all body areas rather than concentrating on just one. Additionally, this study uniquely employs the Rapid Entire Body Assessment (REBA) to analyze the risk levels for MSDs associated with each work task performed by Malaysian traffic police; an aspect that was not addressed in Diyana et al. (2019). A significant contribution of this research is the proposal of a tailored ergonomic module specifically for Malaysian traffic police, which incorporates the current findings to address present issues. This module is intended for effective use by the police to help prevent MSDs.

CHAPTER 6

CONCLUSION AND RECOMMENDATION

6.1 Conclusion

The traffic police officers do exhibit musculoskeletal discomfort at the neck, shoulder and elbow which are similar to previous studies that are mainly caused by their nature of work task that requires an excessive use of muscles on the mentioned body parts. These discomforts may also be caused by the exposure to psychosocial factors in both operational and organisational-related stressors that in conjunction with previous studies' findings, however, raise the question of to what extent these factors do affect the traffic police officers and how to reduce the factors considering the system that has been implemented in the workforce. The traffic police officers are highly exposed to psychosocial factors; both in organisational and operational stressors. Some risk factors such as sociodemographic characteristics (age, family members), lifestyle (smoking, sleep hours), and occupational factors (work experience, colleagues with similar job scope, poor transport condition) do correlates with occurrence of MSDs. The muscle discomforts may also be caused by the exposure to psychosocial factors in both operational and organisational-related stressors that in conjunction with previous studies' findings. Thus, this study indicates that psychosocial factors do affect the prevalence of musculoskeletal disorders among traffic police officers, therefore necessary means can be considered to improve the quality of life of this population.

6.2 Limitation

Some limitations to this study may make it difficult to gather more accurate data for this research. The first one is involving the respondents. Due to this study's attempts to demonstrate voluntary participation, therefore some respondents left some questions blank which led to several missing data and respondents, however, the response rate still exceeds 80%. The second one involves the questionnaires that are being used, the total number of questionnaires and the length of each sentence may exhaust the respondents to answer all questions therefore, it may affect the accuracy of the data in terms of how near it is describing the respondents. In the case of associating REBA score and observed factors, number of participants are very scarce that affecting the analysis to be as accurate as needed. The low participation in REBA is largely due to the method, which involves observing respondents during their work hours. This requires approval for each IPDs as it may impede their work. Apart from that, since, the questionnaire involves psychosocial factors, some respondents are very reluctant to participate in this study as it is one of the vulnerable questions to be asked to them. Thus, bias might occur for they might have been in a state of burnout while answering the question which lead to incorrect descriptions of them. Similarly, some observations may not be accurate as the respondents tend to act differently when being observed by researchers which leads to bias. The instruments used in this study are scale-based on perceived stress that can be questionable upon its genuineness. The population included in this study are male only since the proportion of female traffic police officers is rather small. This could have led to a discrepancy in the data analysis.

In terms of the design of this study which is a cross-sectional study, it may not clearly define the association as there are possibilities of underlying confounders. Therefore,

to strongly associate the relationship of the variables, a longer period of study design such as a cohort can be used for future studies. Plus, the relationship that occurs may be impacted by other factors that are not being assessed in this study. The Impact of physical factors and environmental factors towards MSDs was not assessed in this study.

6.3 Recommendations

This research suggests that employers can consider revising and stipulating a plan to reduce the worker's susceptibility to having musculoskeletal disorders for a better quality of life. It is recommended to cater for the root cause and main issue of MSDs which is the worker's posture when performing work tasks. Hence, conduct posture awareness training towards workers and develop a suitable ergonomic module and a more comprehensive assessment can be done to cater for it as required in the OSHA 1994 and the current practice of industries to prevent MSDs among their workers. The inclusivity of the module may have the ideal working postures therefore, various body positions should be available to traffic enforcers for the best outcomes in terms of health and safety and it would be perfect if they could alternate between standing, sitting, and moving. As such, every thirty minutes, traffic enforcers should be urged to stretch and perform quick exercises to give them plenty of time to unwind and recuperate. As a preventive measure, monitor the occurrence of MSDs related disease every 5 years. It is nearly impossible to change the current system however some considerations can be made. To cater mental wellbeing of the officers, requires yearly counselling and physical examinations that address both mental and physical wellness. Simultaneously, propose providing mindfulness skills training to enhance mental, emotional, and physical well-being that elevate team and individual productivity, and

foster positive community interactions. Include the officers in decision-making processes as part of a strategy for thorough and targeted reforms, particularly when it comes to issues pertaining to their development and well-being.

Some recommendations are given for improvement in future research with relevant topics related to this study as follows: The first recommendation is that future researchers can consider carrying out the study by expanding the scope into every police officers in each divisions of RMP. This is recommended to overcome the limitation in sample size, moreover, they will have a more accurate and representative result when the size of the sample is large. The second one is that future research must consider the measurement tools of questionnaires that include a structured face-to-face interview method. This is done to avoid confusion and to ensure that the data accurately describe themselves, which later able to eliminates the limitation on respondents' answers in the questionnaire and improves the quality of the data.

REFERENCES

Abate, M., Vanni, D., Pantalone, A., & Salini, V. (2013). Cigarette smoking and musculoskeletal disorders. *Muscles, Ligaments and Tendons Journal*, *3*(2), 63. https://doi.org/10.11138/mltj/2013.3.2.063

Achim, A. C. (2014). Ergo-policing. Improving safety and ergonomic requirements of human resources involved in police duties. *Procedia-Social and Behavioral Sciences*, *124*, 20-26. https://doi.org/10.1016/j.sbspro.2014.02.455

Acquadro Maran, D., Varetto, A., Zedda, M., & Ieraci, V. (2023). Anxiety and coping strategies in police officers. *Occupational Medicine*, *65*(6), 466-473. *Medicine*, *65*(6), https://doi.org/466-473. 10.1093/occmed/kqv060

Adedoyin, R. A., Mbada, C. E., Odiachi, A. M., Adegoke, B. O., & Awotidebe, T. O. (2010). Differences in back extensor muscles fatigability for smoking and non-smoking athletes. *Isokinetics and Exercise Science*, *18*(3), 149-155.

Agebure, A. B., Amedorme, S. K., & Johnson, A. N. (2023). Causes and Strategies for Reducing Road Traffic Accidents in the Bongo District of Ghana. *Journal of Engineering Research and Reports*, *25*(9), 166-178. https://doi.org/ 10.36347/sjams.2020.v08i01.023

Ágoston, K. (2020). Studying and measuring system for motor base unbalance. *Procedia Manufacturing*, *46*, 391-396. https://doi.org/10.1016/j.promfg.2020.03.057

Ahmad, E., Daud, A., Hairon, S., Nordin, R., Azmir, N. A., & Jalil, M. A. S. M. (2023). Prevalence and impact of work-related musculoskeletal disorders among food delivery riders in Eastern Peninsular Malaysia. *International Journal of Innovative Research and Scientific Studies*, *6*(3), 586-593. https://doi.org/ 10.53894/ijirss.v6i3.1621

Ahmed, R., Karim, Z., Khan, M. A., Khan, A., Kumar, P., & Younas, M. (2023). Proportion of Joint Pain Patients Seeking Physical Therapy in Quetta City. *Mader-e-Milat International Journal of Nursing and Allied Sciences*, *1*(4), 1-26. https://doi.org/10.5281/zenodo.10446012

Al-Bashaireh, A. M., Haddad, L. G., Weaver, M., Kelly, D. L., Chengguo, X., & Yoon, S. (2018). The effect of tobacco smoking on musculoskeletal health: a systematic review. *Journal Of Environmental and Public Health*, *2018*(1), 4184190. https://doi.org/10.1155/2018/4184190

Al-Sayegh, N., Al-Obaidi, S., & Nadar, M. (2014). Smoking impact on grip strength and fatigue resistance: implications for exercise and hand therapy practice. *Journal of Physical Activity and Health*, *11*(5), 1025-1031.

Alves, L., Abreo, L., Petkari, E., & da Costa, M. P. (2023). Psychosocial risk and protective factors associated with burnout in police officers: A systematic review. *Journal of Affective Disorders*, *332*, 283-298. https://doi.org/10.1016/j.jad.2023.03.081

Andrew, W. (2010). Innova pain clinic: motorcycle riding posture [Internet]. http://www.innova-pain.com/2012/03/02/motorcycle-riding-posture/.

Anwer, S., Li, H., Antwi-Afari, M. F., & Wong, A. Y. L. (2021). Associations between physical or psychosocial risk factors and work-related musculoskeletal disorders in construction workers based on literature in the last 20 years: A systematic review. *International Journal of Industrial Ergonomics*, *83*, 103113. https://doi.org/10.1016/j.ergon.2021.103113

Arman, Z., Nikooy, M., Tsioras, P. A., Heidari, M., & Majnounian, B. (2022). Mental workload, occupational fatigue and musculoskeletal disorders of forestry professionals: The case of a Loblolly plantation in Northern Iran. *Croatian Journal of Forest Engineering: Journal for Theory and Application of Forestry Engineering*, *43*(2), 403-424. https://doi.org/10.5552/crojfe.2022.1639

Arunachalam, M., Singh, A. K., & Karmakar, S. (2021). Perceived comfortable posture and optimum riding position of Indian male motorcyclists for short-duration riding of standard motorcycles. *International journal of industrial ergonomics*, *83*, 103135. https://doi.org/10.1016/j.ergon.2021.103135

Asari, M. S., & Leman, A. M. (2015). Safety training evaluation: Approaches and practices. *Journal of Occupational Safety and Health*, *12*(2), 23-30.

Aseanapol. (2013). The Royal Malaysia Police. http://www.aseanapol.org/information/royal-malaysia-police

Ataguba, G., & Orji, R. (2024). Toward the design of persuasive systems for a healthy workplace: a real-time posture detection. *Frontiers in big Data*, *7*, 1359906. https://doi/org/10.3389/fdata.2024.1359906

Australian Government Comcare. (2020). Psychosocial hazards. https://www.comcare.gov.au/prevent-harm/hazards/psychosocial_hazards

Aziz, S. F. A., & Osman, F. (2019). Does compulsory training improve occupational safety and health implementation? The case of Malaysian. *Safety Science*, *111*, 205-212. https://doi.org/10.1016/j.ssci.2018.07.012

Balasubramanian, V., & Jagannath, M. (2014). Detecting motorcycle rider local physical fatigue and discomfort using surface electromyography and seat interface pressure. *Transportation Research Part F: Traffic Psychology and Behaviour*, *22*, 150-158. https://doi.org/10.1016/j.trf.2013.12.010

Barbosa, E. F., & Maldonado, J. C. (2006). Towards the establishment of a standard process for developing educational modules. *Proceedings. Frontiers in Education. 36th Annual Conference*, 5-10. IEEE.

Basu, R., Dasgupta, A., & Ghosal, G. (2014). Musculo-skeletal disorders among video display terminal users: A cross-sectional study in a software company, Kolkata. *Journal Of Clinical and Diagnostic Research: JCDR*, *8*(12), JC01.

Berita Harian. (2018). Trend polis bersara awal di tahap membimbangkan – Fuzi. https://www.bharian.com.my/berita/nasional/2018/11/499059/trend-polis-bersara-awal-di-tahap-membimbangkan-fuzi

Berner, N., Hunter, D., Biilmann, C., Canetti, E. F., Schram, B., Dawes, J., ... & Orr, R. M. (2024). Impacts of duty belts and load placement on police officers: A systematic review. *NBP. Nauka, bezbednosti, policija*, *29*(2), 67-93. https://doi/org/10.5937/nabepo29-49879

Bęś, P., & Strzałkowski, P. (2024). Analysis of the Effectiveness of Safety Training Methods. *Sustainability*, *16*(7), 2732. https://doi.org/10.3390/su16072732

Beyth, S., Mosheiff, R., Safran, O., Daskal, A., & Liebergall, M. (2015). Cigarette smoking is associated with a lower concentration of CD105+ bone marrow progenitor cells. *Bone Marrow Research*, *2015*(1), 914935.

Blyth, F. M., Briggs, A. M., Schneider, C. H., Hoy, D. G., & March, L. M. (2019). The global burden of musculoskeletal pain—where to from here?. *American Journal of Public Health*, *109*(1), 35-40. https://doi.org/10.2105/ajph.2018.304747

Boivin, D. B., Boudreau, P., & Kosmadopoulos, A. (2022). Disturbance of the circadian system in shift work and its health impact. *Journal of biological rhythms*, *37*(1), 3-28. https://doi.org/10.1177/07487304211064218

Bonanni, R., Cariati, I., Tancredi, V., Iundusi, R., Gasbarra, E., & Tarantino, U. (2022). Chronic Pain in Musculoskeletal Diseases: Do You Know Your Enemy?. *Journal of clinical medicine*, *11*(9), 2609. https://doi.org/10.3390/jcm11092609

Borhany, T., Shahid, E., Siddique, W. A., & Ali, H. (2018). Musculoskeletal problems in frequent computer and internet users. *Journal Of Family Medicine and Primary Care*, *7*(2), 337-339. https://doi.org/10.4103/jfmpc.jfmpc_326_17

Borrego, M., Douglas, E. P., & Amelink, C. T. (2009). Quantitative, qualitative, and mixed research methods in engineering education. *Journal of Engineering Education*, *98*(1), 53-66. https://doi.org/10.1002/j.2168-9830.2009.tb01005.x

Boyd, J. A. (2021). *An Ergonomic Risk Assessment of the Industrial Hemp Industry* (Publication No. 28967306) [Doctoral dissertation, Capitol Technology University]. ProQuest Dissertations & Theses Global.

Brahm, F., & Singer, M. (2013). Is more engaging safety training always better in reducing accidents? Evidence of self-selection from Chilean panel data. *Journal of safety research*, *47*, 85-92.

Brown, J. J., Wells, G. A., Trottier, A. J., Bonneau, J., & Ferris, B. (1998). Back pain in a large Canadian police force. *Spine*, *23*(7), 821-827.

Bryan, M. B., & Poole, M. S. (2021). Bexar County Sheriff's Office Operational and Staffing Study 2021.

Burke, M. J., Sarpy, S. A., Smith-Crowe, K., Chan-Serafin, S., Salvador, R. O., & Islam, G. (2006). Relative effectiveness of worker safety and health training methods. *American Journal of Public Health*, *96*(2), 315-324.

Burton, A. K., Tillotson, K. M., Symonds, T. L., Burke, C., & Mathewson, T. (1996). Occupational risk factors for the first-onset and subsequent course of low back trouble: a study of serving police officers. *Spine*, *21*(22), 2612-2620.

Buruck, G., Tomaschek, A., Wendsche, J., Ochsmann, E., & Dörfel, D. (2019). Psychosocial areas of worklife and chronic low back pain: a systematic review and meta-analysis. *BMC musculoskeletal disorders*, *20*, 1-16. https://doi.org/10.1186/s12891-019-2826-3

Canadian Centre for Occupational Health & Safety. (2014). Work-related musculoskeletal disorders. *Canada: Canadian Centre for Occupational Health & Safety*.

Carayon, P., Smith, M. J., & Haims, M. C. (1999). Work organization, job stress, and work-related musculoskeletal disorders. *Human Factors*, *41*(4), 644-663.

Carvalho, A. L. D. A., Cury, A. A. D. B., & Garcia, R. C. M. R. (2008). Prevalence of bruxism and emotional stress and the association between them in Brazilian police officers. *Brazilian Oral Research*, *22*, 31-35.

Centers for Disease Control and Prevention. (2020). Work-related musculoskeletal disorders & ergonomics. *Centers for Disease Control and Prevention*. https://www.cdc.gov/workplacehealthpromotion/health-strategies/musculoskeletal-disorders/index.html

Chairani, A. (2020). Validity and reliability test of the Nordic Musculoskeletal questionnaire with formal and informal sector workers. *The International Conference on Public Health Proceeding*, *5*(1), 100-106. https://doi.org/10.26911/the7thicph-FP.05.06

Charoenchai, L., Chaikoolvatana, A., & Chaiyakul, P. (2006). The relationship between health behavior and pain scale in patients with low back pain in Thailand. *Southeast Asian Journal of Tropical Medicine and Public Health*, *37*(5), 1040.

Chassanidis, C. G., Malizos, K. N., Varitimidis, S., Samara, S., Koromila, T., Kollia, P., & Dailiana, Z. (2012). Smoking affects mRNA expression of bone morphogenetic proteins in human periosteum. *The Journal of Bone & Joint Surgery British Volume*, *94*(10), 1427-1432.

Cheung, Y. K., & Li, J. C. (2023). Predictors, Mediators and Moderators of Police Work-Related Stress: A Scoping Review. *International journal of environmental research and public health*, *20*(3), 2253. https://doi.org/10.3390/ijerph20032253

Cho, C. Y., Hwang, Y. S., & Cherng, R. J. (2012). Musculoskeletal symptoms and associated risk factors among office workers with high workload computer use. *Journal of Manipulative and Physiological Therapeutics*, *35*(7), 534-540.

Cho, T. S., Jeon, W. J., Lee, J. G., Seok, J. M., & Cho, J. H. (2014). Factors affecting the musculoskeletal symptoms of Korean police officers. *Journal of Physical Therapy Science*, *26*(6), 925-930. https://doi.org/10.1589/jpts.26.925

Choi, J., Lin, Y., & Loh, P. Y. (2022). The Effects of Standing Working Posture on Operation Force and Upper Limb Muscle Activation When Using Different Pointing Devices. *International journal of environmental research and public health*, *19*(16), 10217. https://doi.org/10.3390/ijerph191610217

Choobineh, A., Tabatabaei, S. H., Tozihian, M., & Ghadami, F. (2007). Musculoskeletal problems among workers of an Iranian communication company. *Indian Journal Of Occupational And Environmental Medicine*, *11*(1), 32-36. https://doi.org/10.4103/0019-5278.32462

Cohen, A., Colligan, M. J., Sinclair, R., Newman, J., & Schuler, R. (1998). *Assessing occupational safety and health training.* Cincinnati, OH: National Institutes of Health, 1-174.

Cramer, H., Mehling, W. E., Saha, F. J., Dobos, G., & Lauche, R. (2018). Postural awareness and its relation to pain: validation of an innovative instrument measuring awareness of body posture in patients with chronic pain. *BMC Musculoskeletal Disorders*, *19*(1), 109. https://doi.org/10.1186/s12891-018-2031-9

Crawford, J. O. (2007). The Nordic musculoskeletal questionnaire. *Occupational Medicine*, *57*(4), 300-301. https://doi.org/10.1093/occmed/kqm036

Cuixart, S. N. (2001). NTP 601: Evaluación de las condiciones de trabajo: carga postural. Método REBA (Rapid Entire Body Assessment). *Instituto Nacional de Seguridad e Higiene en el trabajo.*

Cyr, M-P. (2010). *La détresse psychologique et les facteurs professionnels : Étude du milieu policier* (Unpublished Master's thesis). Université de Montréal.

Da Trindade, A. P., de Oliveira, L. C., de Oliveira Santos, B. M., Borges, F., & Oliveira, P. R. (2015). Symptoms of musculoskeletal disorders among police officers. *Surgery*, *4*(23.5), 5.

Daneshmandi, H., Choobineh, A. R., Ghaem, H., Alhamd, M., & Fakherpour, A. (2017). The effect of musculoskeletal problems on fatigue and productivity of office personnel: a cross-sectional study. *Journal of Preventive Medicine and Hygiene*, *58*(3), E252.

Demissie, B., Bayih, E. T., & Demmelash, A. A. (2024). A systematic review of work-related musculoskeletal disorders and risk factors among computer users. *Heliyon*. https://doi.org/10.1016/j.heliyon.2024.e25075

Department of Occupational Safety and Health. (2022). Laporan Tahunan JKKP Malaysia 2022. https://www.dosh.gov.my/index.php/publication-sp-249/annual-report/4623-laporan-tahunan-jkkp-malaysia-2022/file

Department of Occupational Safety and Health. (2015). National council for occupational safety and health (NCOSH) Background. https://www.dosh.gov.my/index.php/about-ncosh/latarbelakang

Department of Occupational Safety and Health. (2016). Self-regulation and occupational safety and health act (OSHA) 1994. https://www.dosh.gov.my/index.php/occupational-health/1707-self-regulation-and-occupational-safety-and-health-act-osha-1994

Department of Occupational Safety and Health. (2017). Guidelines on ergonomics risk assessment at workplace. https://www.dosh.gov.my/index.php/competent-person-form/occupational-health/regulation/guidelines/ergonomic/2621-01-guidelines-on-ergonomics-risk-assessment-at-workplace-2017/file

Department of Occupational Safety and Health. (2019). Quality, occupational safety and health policy. https://www.dosh.gov.my/index.php/about-us-2/dosh-policy/85-safety-and-health-

Dey, A., Saha, A., & Sahu, S. (2023). Effect of occupational stress on musculoskeletal health of traffic police personnel. *Journal of Human Ergology*, *52*(1-2), 23-29.

Dhakal, M., Shah, R. K., Sainju, N. K., & Manandhar, N. (2017). Health status of traffic police in Kathmandu Valley: findings from a cross-sectional study. *International Journal of Occupational Safety and Health*, *7*(1), 2-6. https://doi.org/10.3126/ijosh.v7i1.22759

Diyana, M. A., Karmegam, K., Shamsul, B. M. T., Irniza, R., Vivien, H., Sivasankar, S., ... & Kulanthayan, K. C. M. (2019). Risk factors analysis: Work-related musculoskeletal disorders among male traffic policemen using high-powered motorcycles. *International Journal of Industrial Ergonomics*, *74*, 102863. https://doi.org/10.1016/j.ergon.2019.102863

Diyana, M. A., Karmegam, K., Irniza, R., MT, S. B., Vivien, H., Mani, K. K., Sivasankar, S., & MI, M. H. (2020). High-powered police motorcycle: muscle discomfort among Malaysian traffic police riders. *Malaysian Journal of Public Health Medicine*, *20*(Special1), 255-259.

Dong, H., Zhang, Q., Liu, G., & Shao, T. (2020). Prevalence of neck/shoulder pain among public hospital workers in China and its associated factors: a cross-sectional study. *Scientific Reports*, *10*(1), 12311. https://doi.org/10.1038/s41598-020-69382-4

Douma, N. B., Côté, C., & Lacasse, A. (2019). Quebec serve and protect low back pain study: what about mental quality of life?. *Safety and Health at Work*, *10*(1), 39-46. https://doi.org/10.1016/j.shaw.2018.08.006

Dupuis, F., Sole, G., Wassinger, C., Bielmann, M., Bouyer, L. J., & Roy, J. S. (2021). Fatigue, induced via repetitive upper-limb motor tasks, influences trunk and shoulder kinematics during an upper limb reaching task in a virtual reality environment. *PLoS One*, *16*(4), e0249403. https://doi.org/10.1371/journal.pone.0249403

Edwards, R. R., Almeida, D. M., Klick, B., Haythornthwaite, J. A., & Smith, M. T. (2008). Duration of sleep contributes to next-day pain report in the general population. *Pain®*, *137*(1), 202-207.

Ellison, J. M., & Caudill, J. W. (2020). Working on local time: Testing the job-demand-control-support model of stress with jail officers. *Journal of Criminal Justice, 70,* 101717. https://doi.org/10.1016/j.jcrimjus.2020.101717

Etana, G., Ayele, M., Abdissa, D., & Gerbi, A. (2021). Prevalence of work related musculoskeletal disorders and associated factors among bank staff in Jimma city, Southwest Ethiopia, 2019: an institution-based cross-sectional study. *Journal of Pain Research*, 2071-2082.

European Agency for Safety and Health at Work. (2007). E-Fact 9-Work-Related Mus-culoskeletal Disorders (MSDs): An Introduction. *European Agency for Safety and Health at Work. OSHA Europa*, 1-9.

Farid, S., Ahmad, R., Niaz, I. A., Arif, M., Shamshirband, S., & Khattak, M. D. (2015). Identification and prioritization of critical issues for the promotion of e-learning in Pakistan. *Computers in Human Behavior, 51,* 161-171. https://doi.org/10.1016/j.chb.2015.04.037

Feitosa, A. A., Amaro, E., Sanches, L. G., Borba, E. F., Jorge, L. L., & Halpern, A. S. R. (2020). Chronic low back pain and sick-leave: a functional magnetic resonance study. *Advances in Rheumatology*, *60*, 46. https://doi.org/10.1186/s42358-020-00146-4

Feng, B., Liang, Q. I., Wang, Y., Andersen, L. L., & Szeto, G. (2014). Prevalence of work-related musculoskeletal symptoms of the neck and upper extremity among dentists in China. *BMJ Open*, *4*(12), e006451.

Ferrari, A. J., Santomauro, D. F., Aali, A., Abate, Y. H., Abbafati, C., Abbastabar, H., ... & Bell, M. L. (2024). Global incidence, prevalence, years lived with disability (YLDs), disability-adjusted life-years (DALYs), and healthy life expectancy (HALE) for 371 diseases and injuries in 204 countries and territories and 811 subnational locations, 1990–2021: a systematic analysis for the Global Burden of Disease Study 2021. *The Lancet*, *403*(10440), 2133-2161. https://doi.org/ 10.1016/S0140-6736(24)00757-8

Ferreira, M. L., De Luca, K., Haile, L. M., Steinmetz, J. D., Culbreth, G. T., Cross, M., ... & Mahmoodpoor, A. (2023). Global, regional, and national burden of low back pain, 1990–2020, its attributable risk factors, and projections to 2050: a systematic analysis of the Global Burden of Disease Study 2021. *The Lancet Rheumatology*, *5*(6), e316-e329. https://doi.org/10.1016/S2665-9913(23)00098-X

Fiaz, M. W., Ahmad, A., Munawar, A., Rabia, K., & Fatima, M. (2018). Prevalence of musculoskeletal pain in traffic police wardens of Lahore, Pakistan. *Rawal Medical Journal*, *43*(1), 61-63.

Filtness, A. J., Mitsopoulos-Rubens, E., & Rudin-Brown, C. M. (2014). Police officer in-vehicle discomfort: appointments carriage method and vehicle seat

features. *Applied Ergonomics*, *45*(4), 1247-1256. https://doi.org/10.1016/j.apergo.2014.03.002

Finkelstein, M. M. (1995). Back pain and parenthood. *Occupational and Environmental Medicine*, *52*(1), 51-53.

Fortune, N., Rooney, B., & Kirwan, G. H. (2018). Supporting law enforcement personnel working with distressing material online. *Cyberpsychology, Behavior, and Social Networking*, *21*(2), 138-143. https://doi.org/10.1089/cyber.2016.0715

Foulis, M. (2021). Welding firm ordered to pay $300K after fatal explosion. Canadian Occupational Safety newsletter. https://www.thesafetymag.com/ca/topics/convictions/welding-firm-ordered-to-pay-300k-after-fatal-explosion/253846

Francis, B. R., Ahmad, R., & Abdullah, S. M. (2022). Kesan pengantara sokongan organisasi terhadap hubungan antara persepsi keadilan penilaian prestasi dan niat berhenti kerja dalam kalangan anggota polis. *Jurnal Pengurusan*, *65*, 1-16. https://doi.org/10.17576/pengurusan-2022-65-04

Galanis, P., Fragkou, D., & Katsoulas, T. A. (2021). Risk factors for stress among police officers: A systematic literature review. *Work*, *68*(4), 1255-1272. https://doi.org/10.3233/WOR-213455

Gershon, R. R., Lin, S., & Li, X. (2002). Work stress in aging police officers. *Journal of Occupational and Environmental Medicine*, *44*(2), 160-167.

Ghanea Ahmad, F. T., Ahmad, A., & Gillani, S. A. (2018). Prevalence of upper extremity pain among traffic police, Lahore, Pakistan. *Rawal Medical Journal*, *43*(1), 64-67.

Gómez-Galán, M., Pérez-Alonso, J., Callejón-Ferre, Á. J., & López-Martínez, J. (2017). Musculoskeletal disorders: OWAS review. *Industrial Health*, *55*(4), 314-337.

Granholm Valmari, E., Ghazinour, M., Nygren, U., & Gilenstam, K. (2022). A systematic review of lifestyle and health among patrolling police officers. *Scandinavian Journal of Occupational Therapy*, *30*(5), 721–744. https://doi.org/10.1080/11038128.2022.2083013

Greggi, C., Visconti, V. V., Albanese, M., Gasperini, B., Chiavoghilefu, A., Prezioso, C., Persechino, B., Iavicoli, S., Gasbarra, E., Iundusi, R., & Tarantino, U. (2024). Work-Related Musculoskeletal Disorders: A Systematic Review and Meta-Analysis. *Journal of clinical medicine*, *13*(13), 3964. https://doi.org/10.3390/jcm13133964

Gumasing, M. J. J., Prasetyo, Y. T., Cardoso, M. M., Freitas, J. S., Nadlifatin, R., & Chuenyindee, T. (2023). Determining the ergonomic risk factors affecting the musculoskeletal disorders of traffic enforcers in Manila City, Philippines. *Work*, *75*(2), 603-614. https://doi.org/10.3233/WOR-220011

Gyi, D. E., & Porter, J. M. (1998). Musculoskeletal problems and driving in police officers. *Occupational Medicine*, *48*(3), 153-160. https://doi.org/10.1093/occmed/48.3.153

Habibi, E., Pourabdian, S., Atabaki, A. K., & Hoseini, M. (2012). Evaluation of work-related psychosocial and ergonomics factors in relation to low back discomfort in emergency unit nurses. *International Journal of Preventive Medicine, 3*(8), 564.

Halid, H., Bakar, M. A. A., & Ariff, N. M. (2024). Analyzing optional retirement in Royal Malaysia Police Force (PDRM) using machine learning techniques. *AIP Conference Proceedings, 3150*(1). https://doi.org/10.1063/5.0228039

Han, J. Y., Lee, H., Ohtsubo, Y., & Masuda, T. (2022). Culture and stress coping: Cultural variations in the endorsement of primary and secondary control coping for daily stress across European Canadians, East Asian Canadians, and the Japanese. *Japanese Psychological Research, 64*(2), 141-155. https://doi.org/10.1111/jpr.12406

Han, S. W., & Yoon, H. S. (2024). The Mediating Effect of Self-Esteem on the Relationship Between Job Satisfaction, Leisure Satisfaction, and Quality of Life Among Korean Police Officers. *Healthcare*, *12*(23), 2389. https://doi.org/10.3390/healthcare12232389

Harrison, D. E., Harrison, D. D., Janik, T. J., Jones, E. W., Cailliet, R., & Normand, M. (2001). Comparison of axial and flexural stresses in lordosis and three buckled configurations of the cervical spine. *Clinical Biomechanics, 16*(4), 276-284. https://doi.org/10.1016/S0268-0033(01)00006-7

Hartley, T. A., Burchfiel, C. M., Fekedulegn, D., Andrew, M. E., & Violanti, J. M. (2011). Health disparities in police officers: comparisons to the US general population. *International Journal of Emergency Mental Health, 13*(4), 211.

He, X., Xiao, B., Wu, J., Chen, C., Li, W., & Yan, M. (2023). Prevalence of work-related musculoskeletal disorders among workers in the automobile manufacturing industry in China: a systematic review and meta-analysis. *BMC Public Health, 23*(1), 2042. https://doi.org/10.1186/s12889-023-16896-x

Hignett, S., & McAtamney, L. (2000). Rapid entire body assessment (REBA). *Applied Ergonomics, 31*(2), 201-205.

Hilal, S., & Litsey, B. (2020). Reducing police turnover: Recommendations for the law enforcement agency. *International Journal of Police Science & Management*, *22*(1), 73-83. https://doi.org/10.1177/1461355719882443

Hita-Gutiérrez, M., Gómez-Galán, M., Díaz-Pérez, M., & Callejón-Ferre, Á. J. (2020). An Overview of REBA Method Applications in the World. *International Journal Of Environmental Research And Public Health*, *17*(8), 2635. https://doi.org/10.3390/ijerph17082635

Holmes, M. W. R., McKinnon, C. D., Dickerson, C. R., & Callaghan, J. P. (2013). The effects of police duty belt and seat design changes on lumbar spine posture,

driver contact pressure and discomfort. *Ergonomics*, *56*(1), 126-136. https://doi.org/10.1080/00140139.2012.739206

Holte, K. A., & Follo, G. (2018). Making occupational health and safety training relevant for farmers: Evaluation of an introductory course in occupational health and safety in Norway. *Safety Science*, *109*, 368-376. https://doi.org/10.1016/j.ssci.2018.05.020

Houdmont, J., Kerr, R., & Randall, R. (2012). Organisational psychosocial hazard exposures in UK policing: Management Standards Indicator Tool reference values. *Policing: An International Journal of Police Strategies & Management*, *35*(1), 182-197.

Hoy, D., Brooks, P., Blyth, F., & Buchbinder, R. (2010). The epidemiology of low back pain. *Best Practice & Research Clinical Rheumatology*, *24*(6), 769-781. https://doi.org/10.1016/j.berh.2010.10.002

Hsiao, H. (2023). Assessment of challenges in patrol vehicles and with equipment among law enforcement officers. *Applied ergonomics*, *108*, 103946. https://doi.org/10.1016/j.apergo.2022.103946

Hui, S. K. A., & Grandner, M. A. (2015). Trouble sleeping associated with lower work performance and greater health care costs: longitudinal data from Kansas State Employee Wellness Program. *Journal of Occupational and Environmental Medicine*, *57*(10), 1031-1038.

Human Resource Development Fund. (2020). HRDF approved more than 1 million training places [press release]. https://hrdcorp.gov.my/wpcontent/uploads/2021/03/1.-20200103-Press-Statement-on-HRDFs-2019-Achievements.pdf

Humayon, A. A., Raza, S., Amir, H., Hussain, M. S., & Ansari, N. (2018). Assessment of work stress among police in Pakistan. *Journal of Applied Environmental and Biological Sciences*, *8*(2), 68-73.

Hussain, T. (2004). Musculoskeletal symptoms among truck assembly workers. *Occupational Medicine*, *54*(8), 506-512.

Institute for Public Health. (2023). *National Health and Morbidity Survey (NHMS) 2023*. Ministry of Health Malaysia. https://iku.moh.gov.my/nhms-2023

Irniza, R., & Saliluddin, S. M. (2015). Are Malaysian police really stressed? Understanding their potential stress factors. *International Journal of Public Health and Clinical Sciences*, *2*(5), 45-53.

Irniza, R., Emilia, Z. A., Saliluddin, S. M., & Isha, A. S. N. (2014). A psychometric properties of the Malay-version police stress questionnaire. *The Malaysian Journal of Medical Sciences: MJMS*, *21*(4), 42.

Ismail, H., Abidin, E. Z., Rasdi, I., & Cheah, P. K. (2023). A Comparative Analysis of Auxiliary Enforcement Bodies for Security, Safety and Health Officer Roles

in Malaysia-A Narrative Review. *Malaysian Journal of Medicine & Health Sciences*, *19*.

Jahan, I., Dalal, K., Khan, M. A. S., Mutsuddi, A., Sultana, S., Rashid, M. U., Haque, M. M. A., Hossain, M. A., Hossian, M., Nabi, M. H., & Hawlader, M. D. H. (2023). Occupational health hazards among traffic police in South Asian Countries: Protocol for a scoping review. *JMIR Research Protocols*, *12*, e42239. https://doi.org/10.2196/42239

Jain A R Tony, B., Alphin, M. S., & Sri Krishnan, G. (2020). Simulation of L-4 lumbar spine model of motorist exposed to vibration from speed hump. *Journal of orthopaedics*, *22*, 390–396. https://doi.org/10.1016/j.jor.2020.08.021

James, L., James, S., & Atherley, L. (2024). Evaluating the effectiveness of a fatigue training intervention for the Seattle Police Department: results from a randomized control trial. *Journal of Experimental Criminology*, 1-15. https://doi.org/10.1007/s11292-024-09624-x

James, S. M., & Vila, B. (2015). Police drowsy driving: Predicting fatigue-related performance decay. *Policing: An International Journal of Police Strategies & Management*, *38*(3), 517-538.

Jamil, P. A. S. M., Karuppiah, K., Rasdi, I., How, V., Tamrin, S. B. M., Mani, K. K., ... & Hashim, N. M. (2021). Occupational hazard in Malaysian traffic police: Special focus on air pollutants. *Reviews on Environmental Health*, *36*(2), 167-176. https://doi.org/10.1515/reveh-2020-0107

Jamil, P. A. S. M., Karuppiah, K., Rasdi, I., How, V., Tamrin, S. B. M., Mani, K. K. C., Sambasivam, S., Yusof, N. A. D. M., & Hashim, N. M. (2020). Associations of occupational, socio-demographic and lifestyle factors with lung functions in Malaysian traffic policemen. *Annals of Global Health*, *86*(1), 84. https://doi.org/10.5334/aogh.2895

Jamil, P. A. S. M., Yusof, N. A. D. M., Karuppiah, K., Rasdi, I., Jalaludin, J., Tamrin, S. B. M., ... & Hashim, N. M. (2020). Malaysian traffic police in highly populated areas: Is it safe working outdoors on a daily basis?. *Aerosol and Air Quality Research*, *20*(9), 2003-2011. https://doi.org/10.4209/aaqr.2020.02.0080

Jo, H., Lim, O. B., Ahn, Y. S., Chang, S. J., & Koh, S. B. (2021). Negative Impacts of Prolonged Standing at Work on Musculoskeletal Symptoms and Physical Fatigue: The Fifth Korean Working Conditions Survey. *Yonsei medical journal*, *62*(6), 510–519. https://doi.org/10.3349/ymj.2021.62.6.510

Johnson, J. V., Hall, E. M., & Theorell, T. (1989). Combined effects of job strain and social isolation on cardiovascular disease morbidity and mortality in a random sample of the Swedish male working population. *Scandinavian Journal of Work, Environment & Health*, 271-279.

Joshipura, M., & Gosselin, R. A. (2020). Surgical burden of musculoskeletal conditions in low-and middle-income countries. *World Journal of Surgery*, *44*, 1026-1032. https://doi.org/10.1007/s00268-018-4790-8

Kagan, R., Shiozawa, A., Epstein, A. J., & Espinosa, R. (2021). Impact of sleep disturbances on employment and work productivity among midlife women in the US SWAN database: a brief report. *Menopause*, *28*(10), 1176-1180. https://doi.org/10.1097/GME.0000000000001834

Kamal, A. A., Junaini, S. N., Hashim, A. H., Sukor, F. S., & Said, M. F. (2021). The Enhancement of OSH Training with an Augmented Reality-Based App. *International Journal of Online & Biomedical Engineering*, *17*(13). https://doi.org/10.3991/ijoe.v17i13.24517

Karita, K., Yano, E., Jinsart, W., Boudoung, D., & Tamura, K. (2001). Respiratory symptoms and pulmonary function among traffic police in Bangkok, Thailand. *Archives of Environmental Health: An International Journal*, *56*(5), 467-470. https://doi.org/10.1080/00039890109604484

Karmegam, K. (2019). Enhancing Occupational Safety and Health for Traffic Police Officers: A Call for Action. *Malaysian Journal of Medicine and Health Sciences*, *19*(4), 1-4. https://doi.org/10.47836/mjmhs19.4.1

Karmegam, K., Sapuan, S. M., Ismail, M. Y., Ismail, N., Bahri, M. S., & Seetha, P. (2013). Motorcyclist's riding discomfort in Malaysia: Comparison of BMI, riding experience, riding duration and riding posture. *Human Factors and Ergonomics in Manufacturing & Service Industries*, *23*(4), 267-278. https://doi.org/10.1002/hfm.20317

Kasaw Kibret, A., Fisseha Gebremeskel, B., Embaye Gezae, K., & Solomon Tsegay, G. (2020). Work-related musculoskeletal disorders and associated factors among bankers in Ethiopia, 2018. *Pain Research and Management*, *2020*(1), 8735169.

Keijzer, H., Smits, M. G., Duffy, J. F., & Curfs, L. M. (2014). Why the dim light melatonin onset (DLMO) should be measured before treatment of patients with circadian rhythm sleep disorders. *Sleep Medicine Reviews*, *18*(4), 333-339.

Kim, J. S., & Lee, Y. S. (2008). Causal relationship between military activities and musculoskeletal injuries. *Journal of the Korea Institute of Military Science and Technology*, *11*(6), 142-147.

Kisi, K. P., & Kayastha, R. (2024). Analysis of musculoskeletal pains and productivity impacts among hispanic construction workers. *Heliyon*, *10*(1). https://doi.org/10.1016/j.heliyon.2024.e24023

Kok, M. O., Hoekstra, T., & Twisk, J. W. (2012). The longitudinal relation between smoking and muscle strength in healthy adults. *European Addiction Research*, *18*(2), 70-75.

Konijn, A. M., Lay, A. M., Boot, C. R., & Smith, P. M. (2018). The effect of active and passive occupational health and safety (OHS) training on OHS awareness and empowerment to participate in injury prevention among workers in Ontario and British Columbia (Canada). *Safety Science, 108*, 286-291. https://doi.org/10.1016/j.ssci.2017.12.026

Kourbanova, K., Alexandre, C., & Latremoliere, A. (2022). Effect of sleep loss on pain—New conceptual and mechanistic avenues. *Frontiers in Neuroscience*, *16*, 1009902.

Krajnak, K. (2018). Health effects associated with occupational exposure to hand-arm or whole body vibration. *Journal of Toxicology and Environmental Health, Part B, 21*(5), 320-334. https://doi.org/10.1080/10937404.2018.1557576

Krick, A., & Felfe, J. (2020). Who benefits from mindfulness? The moderating role of personality and social norms for the effectiveness on psychological and physiological outcomes among police officers. *Journal Of Occupational Health Psychology*, *25*(2), 99.

Kumar, V., & Kamalanabhan, T. J. (2017). Moderating role of work support in stressor–burnout relationship: An empirical investigation among police personnel in India. *Psychological Studies*, *62*, 85-97. https://doi.org/10.1007/s12646-017-0383-0

Kundermann, B., Spernal, J., Huber, M. T., Krieg, J. C., & Lautenbacher, S. (2004). Sleep deprivation affects thermal pain thresholds but not somatosensory thresholds in healthy volunteers. *Psychosomatic Medicine*, *66*(6), 932-937.

Larsen, L. B., Andersson, E. E., Tranberg, R., & Ramstrand, N. (2018). Multi-site musculoskeletal pain in Swedish police: associations with discomfort from wearing mandatory equipment and prolonged sitting. *International Archives Of Occupational And Environmental Health*, *91*, 425-433. https://doi.org/10.1007/s00420-018-1292-9

Larsen, L. B., Ramstrand, N., & Fransson, E. I. (2019). Psychosocial job demand and control: multi-site musculoskeletal pain in Swedish police. *Scandinavian Journal of Public Health*, *47*(3), 318-325.

Larsen, L. B., Tranberg, R., & Ramstrand, N. (2016). Effects of thigh holster use on kinematics and kinetics of active duty police officers. *Clinical Biomechanics*, *37*, 77-82. https://doi.org/10.1016/j.clinbiomech.2016.06.009

Lee, J., Lee, W. R., Yoo, K. B., Cho, J., & Yoon, J. (2022). Risk of Cerebro-Cardiovascular Diseases among Police Officers and Firefighters: A Nationwide Retrospective Cohort Study. *Yonsei medical journal*, *63*(6), 585–590. https://doi.org/10.3349/ymj.2022.63.6.585

Leino, T. M., Selin, R., Summala, H., & Virtanen, M. (2011). Violence and psychological distress among police officers and security guards. *Occupational Medicine*, *61*(6), 400-406.

Lemeshow, S., Hosmer, D. W., Klar, J., & Lwanga, S. K. (1990). Adequacy of sample size in health studies. *World Health Organization.* 1–4.

Leung, M. Y., Chan, I. Y. S., & Yu, J. (2012). Preventing construction worker injury incidents through the management of personal stress and organizational stressors. *Accident Analysis & Prevention*, *48*, 156-166

Lis, A. M., Black, K. M., Korn, H., & Nordin, M. (2007). Association between sitting and occupational LBP. *European Spine Journal*, *16*(2), 283-298.

Liu, X., & Li, X. (2022). Exploring the formation mechanism of unsafe construction behavior and testing efficient occupational health and safety (OHS) programs. *International Journal of Environmental Research and Public Health*, *19*(4), 2090. https://doi.org/10.3390/ijerph19042090

Lucas, T., Weidner, N., & Janisse, J. (2012). Where does work stress come from? A generalizability analysis of stress in police officers. *Psychology & Health*, *27*(12), 1426-1447. https://doi.org/10.1080/08870446.2012.687738

Lücke, A. J., Wrzus, C., Gerstorf, D., Kunzmann, U., Katzorreck, M., Hoppmann, C., & Schilling, O. K. (2023). Bidirectional links of daily sleep quality and duration with pain and self-rated health in older Adults' daily lives. *The Journals of Gerontology: Series A*, *78*(10), 1887-1896.

Luttmann, A., Jager, M., Griefahn, B., Caffier, G., Liebers, F., & World Health Organization. (2003). Preventing musculoskeletal disorders in the workplace.

Magnavita, N., & Garbarino, S. (2013). Is absence related to work stress? a repeated cross-sectional study on a special police force. *American Journal of Industrial Medicine*, *56*(7), 765-775. https://doi.org/10.1002/ajim.22155

Mahmoud, N. F., Hassan, K. A., Abdelmajeed, S. F., Moustafa, I. M., & Silva, A. G. (2019). The relationship between forward head posture and neck pain: a systematic review and meta-analysis. *Current Reviews in Musculoskeletal Medicine*, *12*(4), 562-577. https://doi.org/10.1007/s12178-019-09594-y

Maia, D. B., Marmar, C. R., Henn-Haase, C., Nóbrega, A., Fiszman, A., Marques-Portella, C., ... & Figueira, I. (2011). Predictors of PTSD symptoms in Brazilian police officers: the synergy of negative affect and peritraumatic dissociation. *Brazilian Journal of Psychiatry*, *33*, 362-366.

Malaysia Federal Legislation. (2022). Act 514 Occupational Safety and Health Act 1994. https://lom.agc.gov.my/act-detail.php?type=original&lang=BM&act=514

Mamat, M. N., Ab Manan, N. A., Nawi, M. N. M., Hamzah, N. A., & Nawi, M. N. M. (2022). Occupational Stress and General Well-being among Police. *Journal of Energy and Safety Technology (JEST)*, *5*(1), 31-38.

Mariadnyani, N. W., Sanjiwani, I. A., & Pramitaresthi, I. G. A. (2020). Hubungan stres dan kelelahan kerja terhadap keluhan musculoskeletal pada pekerja perempuan di SPA. *Jurnal Ners Widya Husada*, *6*(2), 37-40. https://doi.org/10.33666/jners.v6i2.346

Martínez-Mesa, J., González-Chica, D. A., Bastos, J. L., Bonamigo, R. R., & Duquia, R. P. (2014). Sample size: how many participants do I need in my research?. *Anais brasileiros de dermatologia*, *89*(4), 609–615. https://doi.org/10.1590/abd1806-4841.20143705

Masilamani, R., Bulgiba, A., Chinna, K., Darus, A., Isahak, M., Kandiben, S., & Koh, D. (2013). Prevalence and associated factors of stress in the Malaysian Police Force. *Preventive Medicine*, *57*, S57-S59. https://doi.org/10.1016/j.ypmed.2013.01.008

McAtamney, L., & Corlett, E. N. (1993). RULA: a survey method for the investigation of work-related upper limb disorders. *Applied Ergonomics*, *24*(2), 91-99.

McCabe, J. (2013). An analysis of police department staffing: How many officers do you really need. *ICMA Center for Public Safety Management White Paper*.

McCraty, R., & Atkinson, M. (2012). Resilience training program reduces physiological and psychological stress in police officers. *Global Advances In Health And Medicine*, *1*(5), 44-66. https://doi.org/10.7453/gahmj.2012.1.5.013

McCreary, D. R., & Thompson, M. M. (2006). Development of two reliable and valid measures of stressors in policing: The operational and organizational police stress questionnaires. *International Journal of Stress Management*, *13*(4), 494.

McNee, C., Kieser, J. K., Antoun, J. S., Bennani, H., Gallo, L. M., & Farella, M. (2013). Neck and shoulder muscle activity of orthodontists in natural environments. *Journal of Electromyography and Kinesiology*, *23*(3), 600-607. https://doi.org/10.1016/j.jelekin.2013.01.011

Ministry of Transportation Malaysia. (2023). *Ministry of Transport Malaysia Official Portal*. Ministry of Transport Malaysia. https://www.mot.gov.my/en/media/annual-report/yearly-statistic

Mohamed, N., Abidin, E. Z., Rasdi, I., Ismail, Z. S., & Ismail, N. H. (2021). Occupational Stressors Experienced by Police Officers During Coronavirus Disease (Covid-19) Outbreak--A Systematic Literature Review. *Malaysian Journal of Medicine & Health Sciences*, *17*.

Mona, G. G., Chimbari, M. J., & Hongoro, C. (2019). A systematic review on occupational hazards, injuries and diseases among police officers worldwide: Policy implications for the South African Police Service. *Journal of Occupational Medicine and Toxicology (London, England)*, *14*, 2. https://doi.org/10.1186/s12995-018-0221-x

Nabeel, I., Baker, B. A., McGrail Jr, M. P., & Flottemesch, T. J. (2007). Correlation between physical activity, fitness, and musculoskeletal injuries in police officers. *Minnesota Medicine*, *90*(9), 40-43.

National Institute for Occupational Safety and Health. (2015). Hierarchy of controls. *U.S Centers for Disease Control and Prevention.* https://www.cdc.gov/niosh/topics/hierarchy/default.html

National Institute of Occupational Safety and Health. (n.d). Statistics. *Ministry of Human Resources Malaysia.* http://www.niosh.com.my/online-statistic

Naz, S., Kousar, A., Aslam, B., Matiullah, A., & Waqar, S. (2022). Prevalence of work-related musculoskeletal disorders among traffic police in Rawalpindi and

Islamabad. *Rehabilitation Communications, 1*(01), 31-37. https://doi.org/10.55627/rehab.001.01.0195

Neupane, S., Leino-Arjas, P., Nygård, C. H., Miranda, H., Siukola, A., & Virtanen, P. (2015). Does the association between musculoskeletal pain and sickness absence due to musculoskeletal diagnoses depend on biomechanical working conditions?. *International Archives Of Occupational And Environmental Health*, *88*, 273-279.

Niazmand-Aghdam, N., Ranjbarian, M., Khodakarim, S., Mohammadian, F., & Dehghan, S. F. (2021). The effects of combined exposure to road traffic noise and whole body vibration on types of attention among men. *La Medicina del Lavoro*, *112*(5), 360. https://doi.org/10.23749/mdl.v112i5.11772

Njaka, S., Yusoff, D. M., Anua, S. M., Kueh, Y. C., & Edeogu, C. O. (2021). Musculoskeletal disorders (MSDs) and their associated factors among quarry workers in Nigeria: A cross-sectional study. *Heliyon*, *7*(2). https://doi.org/10.1016/j.heliyon.2021.e06130

Nurkertamanda, D., Budiawan, W., Zahra, Z. A., & Gitowardojo, R. J. (2025). Experimental design for a sustainable society among motorcyclists: The influence of road types and speeds on whole-body vibration exposure and musculoskeletal disorders in motorcyclists. *Multidisciplinary Science Journal*, *7*(2), 2025053-2025053. https://doi.org/ 10.31893/multiscience.2025053

Nussbaum, M. A. (2001). Static and dynamic myoelectric measures of shoulder muscle fatigue during intermittent dynamic exertions of low to moderate intensity. *European Journal of Applied Physiology*, *85*, 299-309.

Occupational Safety and Health Act. (1994). Retrieved 5 May 2021, from https://www.dosh.gov.my/index.php/legislation/acts/23-02-occupational-safety-and-health-act-1994-act-514/file

Offshore Petroleum Industry Training Organisation (OPITO). (n.d). About OPITO Standards. https://opito.com/standards-and-qualifications/about-opito-standards

Ojha, A., Seagers, J., Shayesteh, S., Habibnezhad, M., & Jebelli, H. (2020, December). Construction safety training methods and their evaluation approaches: a systematic literature review. *Proceedings of the 8th International Conference on Construction Engineering and Project Management*, 188-197.

Omar, M. K., Aluwi, A. H., Hussein, N., Mohd, I. H., & Rusdi, S. D. (2020). Factors influencing job stress among Malaysian traffic police officers. *International Journal of Financial Research*, *11*(3), 155-61. https://doi.org/10.5430/ijfr.v11n3p155

Ozvurmaz, S., & Mandiracioglu, A. (2017). Prevelans of Upper Extremity Musculoskeletal complaints and its relationship with risk factors for Bank employees Working with Computer. *The Ulutas Medical Journal*, *3*(2), 39-47.

Padyab, M., Backteman-Erlanson, S., & Brulin, C. (2016). Burnout, coping, stress of conscience and psychosocial work environment among patrolling police officers. *Journal Of Police And Criminal Psychology*, *31*, 229-237.

Palsson, T. S., Rubio-Peirotén, A., & Doménech-García, V. (2023). Sleep deprivation increases pain sensitivity following acute muscle soreness. *Sleep Medicine*, *109*, 75-81. https://doi.org/10.1016/j.sleep.2023.06.010

Pandey, N., & Bindra, S. (2023). Prevalence and risk factors of musculoskeletal disorders among police employees: a survey study. https://doi.org/10.52403/ijshr.20230319

Pandey, R. K., Josh, J., & Mohapatra, S. C. (2021). Effect of tobacco consumption-A review. *J Community Health Manag*, *8*(1), 6-11. https://doi.org/10.18231/j.jchm.2021.003

Papazoglou, K., & Tuttle, B. M. (2018). Fighting police trauma: Practical approaches to addressing psychological needs of officers. *Sage open*, *8*(3), https://doi.org/10.1177/2158244018794794.

Paudel, L., Manandhar, N., & Joshi, S. K. (2018). Work-related musculoskeletal symptoms among traffic police: A review. *International Journal of Occupational Safety and Health*, *8*(2), 4-12. https://doi.org/10.3126/ijosh.v8i2.23330

Perneger, T. V., Courvoisier, D. S., Hudelson, P. M., & Gayet-Ageron, A. (2015). Sample size for pre-tests of questionnaires. *Quality of life Research*, *24*, 147-151. https://doi.org/10.1007/s11136-014-0752-2

Phadke, S. S. D., Revati, R. A. J. A. K., & Iqbal, R. (2015). Work related musculoskeletal symptoms among traffic police: cross sectional survey using Nordic musculoskeletal questionnaire. *Int J Recent Res Interdiscip Sci*, *2*(2), 26-29.

Phadke, S. S. D., Sandhu, H. A. S. M. E. E. T., RaufIqbal, S. Y., & Yardi, D. S. (2014). Prevalence of obesity in Navi-Mumbai Traffic Police and associated change in lumbar curvature angle. *Journal of International Academic Research for Multidisciplinary*, *2*(3), 566-574.

Pleho, D., Hadžiomerović, A. M., Pleho, K., Pleho, J., Remić, D., Arslanagić, D., ... & Alibegović, A. (2021). Work caused musculoskeletal disorders in health professionals. *Journal of Health Sciences*, *11*(1), 7-16. https://doi.org/10.17532/jhsci.2021.1209

Police Act. (1967). Retrieved 5 May 2021, from https://ccid.rmp.gov.my/Laws/Police_Act_1967.pdf

Porter, J. M., & Gyi, D. E. (2002). The prevalence of musculoskeletal troubles among car drivers. *Occupational Medicine*, *52*(1), 4-12.

Prasoon, S. & Subramanian, S. (2023). Prevalence of low back ache and functional disability among traffic police in South Bangalore. *Journal of Ecophysiology and Occupational Health*. 23-28. https://doi.org/10.18311/jeoh/2023/32076.

Punnett, L., & Wegman, D. H. (2004). Work-related musculoskeletal disorders: the epidemiologic evidence and the debate. *Journal of Electromyography And Kinesiology, 14*(1), 13-23. https://doi.org/10.1016/j.jelekin.2003.09.015

Queirós, C., Passos, F., Bártolo, A., Faria, S., Fonseca, S. M., Marques, A. J., Silva, C. F., & Pereira, A. (2020). Job Stress, Burnout and Coping in Police Officers: Relationships and Psychometric Properties of the Organizational Police Stress Questionnaire. *International Journal of Environmental Research and Public Health, 17*(18), 6718. https://doi.org/10.3390/ijerph17186718

Rabbing, L., Bjørkelo, B., & Langvik, E. (2022). Upper and lower musculoskeletal back pain, stress, physical activity, and organisational work support: An exploratory study of police investigative interviewers. *Health psychology open*, *9*(2), 20551029221146396. https://doi.org/10.1177/20551029221146396

Rahman, H. A., Abdul-Mumin, K., & Naing, L. (2017). Psychosocial work stressors, work fatigue, and musculoskeletal disorders: comparison between emergency and critical care nurses in Brunei Public Hospitals. *Asian Nursing Research*, *11*(1), 13-18. https://doi.org/10.1016/j.anr.2017.01.003

Ramstrand, N., & Larsen, L. B. (2012). Musculoskeletal injuries in the workplace: perceptions of Swedish police. *International Journal of Police Science & Management*, *14*(4), 334-342. https://doi.org/10.1350/ijps.2012.14.4.293

Ramstrand, N., Zügner, R., Larsen, L. B., & Tranberg, R. (2016). Evaluation of load carriage systems used by active duty police officers: relative effects on walking patterns and perceived comfort. *Applied Ergonomics*, *53*, 36-43. https://doi.org/10.1016/j.apergo.2015.08.007

Rasdi, I. (2018). Generic and police-specific occupational risk factors of mental health and well-being among urban and sub-urban Malaysian traffic police officers. *Malaysian Journal of Medicine & Health Sciences, 14*.

Rasdi, I., Din, N. F., & Roni, N. (2020). Fatigue Among Traffic Police Officers in Metropolitan City: Exploring Factors of Noise Exposure and Work Stressors. *Malaysian Journal of Medicine & Health Sciences, 16*.

Reis, F. J., da Silva Bonfim, I., Corrêa, L. A., Nogueira, L. C., Meziat-Filho, N., & de Almeida, R. S. (2024). Uncovering emotional and network dynamics in the speech of patients with chronic low back pain. *Musculoskeletal Science and Practice*, *70*, 102925. https://doi.org/10.1016/j.msksp.2024.102925

Rhee, H. Y., Cho, J. H., Seok, J. M., Cho, T. S., Jeon, W. J., Lee, J. G., & Kim, S. K. (2015). Prevalence of musculoskeletal disorders among Korean police personnel. *Archives of Environmental & Occupational Health*, *70*(4), 177-188.

Richards, J. E., Hohl, S. D., Segal, C. D., Grossman, D. C., Lee, A. K., Whiteside, U., … Williams, E. C. (2021). "What Will Happen If I Say Yes" Perspectives on a Standardized Firearm Access Question Among Adults With Depressive Symptoms. Psychiatric Services, 72(8), 898–904. https://doi.org/10.1176/appi.ps.202000187

Roberg, R. R., Kuykendall, J. L., & Novak, K. (2002). *Police management* (pp. 23-44). Los Angeles: Roxbury Publishing Company.

Robson, L., Stephenson, C., Schulte, P., Amick, B., Chan, S., Bielecky, A., ... & Grubb, P. (2010). A systematic review of the effectiveness of training & education for the protection of workers. *Toronto: Institute for Work & Health*, 2127.

Rom, O., Kaisari, S., Aizenbud, D., & Reznick, A. Z. (2012). Identification of possible cigarette smoke constituents responsible for muscle catabolism. *Journal of Muscle Research and Cell Motility*, *33*, 199-208.

Royal Malaysian Police. (2010). *Buku Panduan Bantuan/Kemudahan kepada Pegawai, Anggota dan Pegawai Awam PDRM*. Kuala Lumpur: Royal Malaysian Police.

Rufai, A. A., Oyeyemi, A. L., Maduagwu, S. M., Fredrick, A. D., Aliyu, S. U., & Lawan, A. (2019). Work-related musculoskeletal disorders among Nigerian police force. *Nigerian Journal of Basic and Clinical Sciences*, *16*(2), 127-133.

Sacks, R., Perlman, A., & Barak, R. (2013). Construction safety training using immersive virtual reality. *Construction Management and Economics*, *31*(9), 1005-1017.

Sadeghniiat-Haghighi, K., & Yazdi, Z. (2015). Fatigue management in the workplace. *Industrial Psychiatry Journal*, *24*(1), 12-17. https://doi.org/10.4103/0972-6748.160915

SafetyLine Lone Worker. (2016). Hazards Series: Ergonomic Hazards in the Workplace. https://safetylineloneworker.com/blog/workplace-hazards-series-ergonomics/

Samad, N. I. A., Maridin, A. F. Z., Hamzah, N. A., Anua, S. M., Mamat, M. N., & Nawi, M. N. M. (2022). Prevalence of back pain among food delivery riders in Kota Bharu, Kelantan: a preliminary study. *Journal of Energy and Safety Technology (JEST)*, *5*(2), 52-60. https://doi.org/10.11113/jest.v5n2.118

Sanberg, E. L., Brito, C. S., Luna, A. M., & McFadden, S. M. (2010). A guide to occupational health and safety for law enforcement executives. *Police Executive Research Forum*.

Sany, S. A., Tanjim, T., & Hossain, M. I. (2021). Low back pain and associated risk factors among medical students in Bangladesh: a cross-sectional study. *F1000Research*, *10*, 698. https://doi.org/10.12688/f1000research.55151.3

Schwartz, A. H., Albin, T. J., & Gerberich, S. G. (2019). Intra-rater and inter-rater reliability of the rapid entire body assessment (REBA) tool. *International Journal of Industrial Ergonomics*, *71*, 111-116. https://doi.org/10.1016/j.ergon.2019.02.010

Scott, E., Rodríguez, G., Soria, Á., & Campo, M. (2014). Experiences in software engineering education: using scrum, agile coaching, and virtual reality. In *Overcoming challenges in software engineering education: Delivering non-technical knowledge and skills*, 250-276. https://doi.org/10.4018/978-1-5225-3923-0.ch050

Siyeon, K., & Wonyoung, J. (2020). Physiological and psychological neck load imposed by ballistic helmets during simulated military activities. *Fashion and Textiles, 7*(1). https://doi.org/10.1186/s40691-020-00216-7

Skarpsno, E. S., Mork, P. J., Nilsen, T. I. L., & Nordstoga, A. L. (2020). Influence of sleep problems and co-occurring musculoskeletal pain on long-term prognosis of chronic low back pain: the HUNT Study. *J Epidemiol Community Health*, *74*(3), 283-289.

Smoktunowicz, E., Baka, L., Cieslak, R., Nichols, C. F., Benight, C. C., & Luszczynska, A. (2015). Explaining counterproductive work behaviors among police officers: The indirect effects of job demands are mediated by job burnout and moderated by job control and social support. *Human Performance*, *28*(4), 332-350.

Soares, C. O., Pereira, B. F., Pereira Gomes, M. V., Marcondes, L. P., de Campos Gomes, F., & de Melo-Neto, J. S. (2020). Preventive factors against work-related musculoskeletal disorders: narrative review. *Revista brasileira de medicina do trabalho : publicacao oficial da Associacao Nacional de Medicina do Trabalho-ANAMT*, *17*(3), 415–430. https://doi.org/10.5327/Z1679443520190360

Sofat, N., & Keat, A. (2002). Alcohol intake in rheumatic disease: good or bad?. *Rheumatology*, *41*(2), 125-128. https://doi.org/10.1093/rheumatology/41.2.125

Sood, D., Nussbaum, M. A., Hager, K., & Nogueira, H. C. (2017). Predicted endurance times during overhead work: influences of duty cycle and tool mass estimated using perceived discomfort. *Ergonomics*, *60*(10), 1405-1414. https://doi.org/10.1080/00140139.2017.1293850

Stefan, H., Mortimer, M., Horan, B., & McMillan, S. (2024). How effective is virtual reality for electrical safety training? Evaluating trainees' reactions, learning, and training duration. *Journal of Safety Research*, *90*, 48-61. https://doi.org/10.1016/j.jsr.2024.06.002

Stewart, W. F., Ricci, J. A., Chee, E., Morganstein, D., & Lipton, R. (2003). Lost productive time and cost due to common pain conditions in the US workforce. *Jama*, *290*(18), 2443-2454.

Stogner, J., Miller, B. L., & McLean, K. (2020). Police stress, mental health, and resiliency during the COVID-19 pandemic. *American Journal of Criminal Justice*, *45*, 718-730. https://doi.org/10.1007/s12103-020-09548-y

Summerlin, Z., Oehme, K., Stern, N., & Valentine, C. (2010). Disparate levels of stress in police and correctional officers: Preliminary evidence from a pilot study on domestic violence. *Journal of Human Behavior in the Social Environment*, *20*(6), 762-777.

Sun, Y., Laksono, I., Selvanathan, J., Saripella, A., Nagappa, M., Pham, C., ... & Chung, F. (2021). Prevalence of sleep disturbances in patients with chronic non-cancer pain: a systematic review and meta-analysis. *Sleep Medicine Reviews*, *57*, 101467.

Takala, E. P., Pehkonen, I., Forsman, M., Hansson, G. Å., Mathiassen, S. E., Neumann, W. P., ... & Winkel, J. (2010). Systematic evaluation of observational methods assessing biomechanical exposures at work. *Scandinavian Journal of Work, Environment & Health*, 3-24.

Tamura, K., Jinsart, W., Yano, E., Karita, K., & Boudoung, D. (2003). Particulate air pollution and chronic respiratory symptoms among traffic policemen in Bangkok. *Archives of Environmental Health: An International Journal*, *58*(4), 201-207. https://doi.org/10.3200/AEOH.58.4.201-207

Tang, K. H. D. (2020). Abating biomechanical risks: A comparative review of ergonomic assessment tools. *Journal of Engineering Research and Reports*, *17*(3), 41-51. https://doi.org/10.9734/JERR/2020/v17i317191

Tarantino, U., Cariati, I., Greggi, C., Gasbarra, E., Belluati, A., Ciolli, L., Maccauro, G., Momoli, A., Ripanti, S., Falez, F., & Brandi, M. L. (2021). Skeletal System Biology and Smoke Damage: From Basic Science to Medical Clinic. *International Journal of Molecular Sciences*, *22*(12), 6629. https://doi.org/10.3390/ijms22126629

Tavares, J. M. A., Rodacki, A. L. F., Hoflinger, F., dos Santos Cabral, A., Paulo, A. C., & Rodacki, C. L. N. (2020). Physical Performance, Anthropometrics and Functional Characteristics Influence the Intensity of Nonspecific Chronic Low Back Pain in Military Police Officers. *International Journal of Environmental Research and Public Health*, *17*(17), 6434. https://doi.org/10.3390/ijerph17176434

Taylor, A., & Bennell, C. (2006). Operational and organizational police stress in an Ontario police department: A descriptive study. *Canadian Journal of Police and Security Services*, *4*(4), 223-234.

Telaprolu, N., & Anne, S. D. (2014). Physical and psychological work demands as potential risk factors for musculoskeletal disorders among workers in weaving operations. *Indian Journal Of Occupational And Environmental Medicine*, *18*(3), 129-134.

Tews, M. J., & Noe, R. A. (2019). Does training have to be fun? A review and conceptual model of the role of fun in workplace training. *Human Resource*

Management Review, *29*(2), 226-238. https://doi.org/10.1016/j.hrmr.2017.11.003

The Official Portal of Royal Malaysia Police. (2019). Mengenai Polis Diraja Malaysia. http://www.rmp.gov.my/inforkorporate/polis-diraja-malaysia.

The Official Portal of Royal Malaysia Police. (2022). Mengenai Polis Diraja Malaysia. http://www.rmp.gov.my/inforkorporate/polis-diraja-malaysia.

The Official Portal of Royal Malaysia Police. (2022b). Jabatan-jabatan (Departments). http://www.rmp.gov.my/base.cfm?path=about/ about.cfm?mod=8

Thien, B., Voo, P., & Maakip, I. (2022). Prevalens ketidakselesaan muskuloskeletal (MSD discomfort) dalam kalangan anggota polis trafik di Sabah. *Southeast Asia Psychology Journal, 10*(2), 165-174.

Thomas, K., Nilsson, E., Festin, K., Henriksson, P., Lowén, M., Löf, M., & Kristenson, M. (2020). Associations of psychosocial factors with multiple health behaviors: a population-based study of middle-aged men and women. *International Journal Of Environmental Research And Public Health*, *17*(4), 1239. https://doi.org/10.3390/ijerph17041239

Todd, A. I., Bennett, A. I., & Christie, C. J. (2007). Physical implications of prolonged sitting in a confined posture-a literature review. *Ergonomics SA: Journal of the Ergonomics Society of South Africa*, *19*(2), 7-21. https://doi.org/10.52403/ijshr.20230319

Tyagi, A., & Dhar, R. L. (2014). Factors affecting health of the police officials: Mediating role of job stress. *Policing: An International Journal of Police Strategies & Management*, *37*(3), 649-664.

UNDESA. (2021). Sustainable Development Goals Report 2021. *United Nations.*

Unit of Employee Recruitments. (2009). Prospek Kerjaya. https://www.rmp.gov.my/base.cfm?path=about/about.cfm?mod=8

Upton, J. (2013). Psychosocial factors. *Encyclopedia of Behavioral Medicine*, 1580–1581. https://doi.org/10.1007/978-1-4419-1005-9_422

Van Assen, M. F. (2020). Training, employee involvement and continuous improvement – the moderating effect of a common improvement method. *Production Planning & Control*, *32*(2), 132–144. https://doi.org/10.1080/09537287.2020.1716405

Vijay, S. A. (2013). Work-related musculoskeletal health disorders among the information technology professionals in India: A prevalence study. *Int J Mgmt Res Bus Strat*, *2*(2), 118-28.

Vila, B. (2006). Impact of long work hours on police officers and the communities they serve. *American Journal of Industrial Medicine*, *49*(11), 972-980. https://doi.org/10.1002/ajim.20333

Violanti, J. M. (2010). Police suicide: A national comparison with fire-fighter and military personnel. *Policing: An International Journal of Police Strategies & Management*, *33*(2), 270-286.

Violanti, J. M. (2017). Shift work and fatigue among police officers: The BCOPS study. *Workplace Health & Safety*, *65*(9), 407-408.

Violanti, J. M., & Aron, F. (1994). Ranking police stressors. *Psychological Reports, 75*, 824-826.

Violanti, J. M., Charles, L. E., McCanlies, E., Hartley, T. A., Baughman, P., Andrew, M. E., Fekedulegn, D., Ma, C. C., Mnatsakanova, A., & Burchfiel, C. M. (2017b). Police stressors and health: a state-of-the-art review. *Policing (Bradford, England)*, *40*(4), 642–656. https://doi.org/10.1108/PIJPSM-06-2016-0097

Violanti, J. M., Fekedulegn, D., Hartley, T. A., Charles, L. E., Andrew, M. E., Ma, C. C., & Burchfiel, C. M. (2016). Highly rated and most frequent stressors among police officers: Gender differences. *American Journal of Criminal Justice*, *41*, 645-662. https://doi.org/10.1007/s12103-016-9342-x

Wagner, S. L., White, N., Fyfe, T., Matthews, L. R., Randall, C., Regehr, C., ... & Fleischmann, M. H. (2020). Systematic review of posttraumatic stress disorder in police officers following routine work-related critical incident exposure. *American journal of industrial medicine*, *63*(7), 600-615. https://doi.org/10.1002/ajim.23120

Wang, X., & Cheng, Z. (2020). Cross-sectional studies: strengths, weaknesses, and recommendations. *Chest*, *158*(1), S65-S71. https://doi.org/10.1016/j.chest.2020.03.012

Wang, L., van Iersel, L. E. J., Pelgrim, C. E., Lu, J., van Ark, I., Leusink-Muis, T., Gosker, H. R., Langen, R. C. J., Schols, A. M. W. J., Argilés, J. M., van Helvoort, A., Kraneveld, A. D., Garssen, J., Henricks, P. A. J., Folkerts, G., & Braber, S. (2022). Effects of Cigarette Smoke on Adipose and Skeletal Muscle Tissue: In Vivo and In Vitro Studies. *Cells*, *11*(18), 2893. https://doi.org/10.3390/cells11182893

Waters, J. A., & Ussery, W. (2007). Police stress: History, contributing factors, symptoms, and interventions. *Policing: An International Journal of Police Strategies & Management*, *30*(2), 169-188. https://doi.org/10.1108/13639510710753199

Waters, T. R., & Dick, R. B. (2015). Evidence of health risks associated with prolonged standing at work and intervention effectiveness. *Rehabilitation Nursing*, *40*(3), 148-165.

Weinstock, D., & Slatin, C. (2012). Learning to take action: the goals of health and safety training. *New Solutions : A Journal Of Environmental And Occupational Health Policy : NS*, *22*(3), 255–267. https://doi.org/10.2190/NS.22.3.b

Weng. (2001). Motorcycle news: how to avoid aches and pains when riding. http://www.motorcyclenews.com/news/2001/may/how-to-avoid-aches-and -pains-when-riding/.

Wiese, L., Rothmann, S., & Storm, K. (2003). Coping, stress and burnout in the South African police service in KwaZulu-Natal. *SA Journal of Industrial Psychology*, *29*(4), 71-80.

Williams, A., Kamper, S. J., Wiggers, J. H., O'Brien, K. M., Lee, H., Wolfenden, L., ... & Williams, C. M. (2018). Musculoskeletal conditions may increase the risk of chronic disease: a systematic review and meta-analysis of cohort studies. *BMC Medicine*, *16*, 1-9. https://doi.org/10.1186/s12916-018-1151-2

Wilson, S., & Nutt, D. (2013). *Sleep disorders*. OUP Oxford.

Witten, C., Claasen, N., Kruger, H. S., Coutsoudis, A., & Grobler, H. (2020). Psychosocial barriers and enablers of exclusive breastfeeding: lived experiences of mothers in low-income townships, North West Province, South Africa. *International Breastfeeding Journal*, *15*, 1-15. https://doi.org/10.1186/s13006-020-00320-w

World Health Organization. (2021). Mental Health. https://www.who.int/health-topics/mental-health#tab=tab_2

World Health Organization. (2022). Musculoskeletal Health. https://www.who.int/news-room/fact-sheets/detail/musculoskeletal-conditions

World Health Organization. (2023). Low Back Pain. https://www.who.int/news-room/fact-sheets/detail/low-back-pain

Wu, G., & Wen, M. (2020). Predicting three dimensions of police officer stress: does rural or urban setting matter?. *Policing: An International Journal*, *43*(3), 435-449. https://doi.org/10.1108/PIJPSM-03-2019-0042

Yadav, B., Anil, K. C., Bhusal, S., & Pradhan, P. M. S. (2022). Prevalence and factors associated with symptoms of depression, anxiety and stress among traffic police officers in Kathmandu, Nepal: a cross-sectional survey. *BMJ Open*, *12*(6), e061534. https://doi.org/10.1136/bmjopen-2022-061534

Yogisutanti, G., Ekawati, E., & Suhat, S. (2022). Musculoskeletal disorders, work stress, and fatigue of workers as the impact of work from home activities during the Covid-19 pandemic. *Malaysian Journal of Medicine and Health Sciences*, *18*(SUPP17), 325-332. https://doi.org/10.47836/mjmhs18.6.x

Yogisutanti, G., Hotmaida, L., Gustiani, Y., Panjaitan, S. W., & Suhat, S. (2020). Teaching under stress and fatigue: Can affect of the performance?. *Al-Sihah: The Public Health Science Journal*, 112-123. https://doi.org/10.24252/as.v12i1.10283

Yusof, N. A. D. M. (2016). *Association between occupational and nonoccupational risk to work-related musculoskeletal disorders among traffic police riders*. [Master's thesis]. Universiti Putra Malaysia.

Zakaria, N. Z. A. (2023). *An example of measuring REBA angle of an officer performing traffic control duty* [Photograph].

Zare, A., Choobineh, A., Hassanipour, S., & Malakoutikhah, M. (2021). Investigation of psychosocial factors on upper limb musculoskeletal disorders and the prevalence of its musculoskeletal disorders among nurses: a systematic review and meta-analysis. *International Archives of Occupational and Environmental Health*, *94*, 1113-1136. https://doi.org/10.1007/s00420-021-01654-6

Zhenjing, G., Chupradit, S., Ku, K. Y., Nassani, A. A., & Haffar, M. (2022). Impact of Employees' Workplace Environment on Employees' Performance: A Multi-Mediation Model. *Frontiers in public health*, *10*, 890400. https://doi.org/10.3389/fpubh.2022.890400

LAMPIRAN A

JADUAL SESI TEMUDUGA RESPONDEN (MOTOSIKAL) BAGI JABATAN SIASATAN DAN PENGUATKUASAAN TRAFIK

BULAN	DAERAH	BIL RESPONDEN	NAMA PENYELARAS
FEB	IPD SHAH ALAM	10	DSP MUHAMMAD ZAKI BIN RAHMAT
MAC	IPD PETALING JAYA	10	DSP MOHD AYOB BIN ABU
MAC	IPD PUTRAJAYA	10	ASP MOHD ASRI BIN ABDUL
APRIL	JSPT KUALA LUMPUR	15	ASP RAJA MAHADI BIN RAJA MAHMUDIN
APRIL	IPD SEREMBAN	10	ASP FIRDAUS SYAFIQ BIN ABU TALIB
APRIL	IPD PORT DICKSON	10	ASP HAIRUZZAMAN BIN MOHD KHALID
MEI	IPD NILAI	10	ASP MOHD HAFIDZAL BIN ZAINAL ABIDIN
MEI	IPD MELAKA TENGAH	10	ASP AHMAD FAIZAL BIN AMINUDDIN
MEI	IPD KOTA TINGGI	10	ASP BIBIANA ANAK MANGGAI
JUN	IPD JASIN	10	INSP HAFIZUDDIN BIN HUSSIN
JUN	IPD BATU PAHAT	10	ASP MUHAMAD SHYAMIR AL AMAR BIN MUHAMAD TOBIB
JUN	IPD TAIPING	10	ASP NG WEI BOON
JULAI	IPD BATU GAJAH	10	ASP MOHD ROJIHAN BIN HALIM
JULAI	IPD KUALA MUDA	10	DSP RUSLI BIN HASHIM
JULAI	IPD SPS	10	INSP GOVINDASAMY A/L RAMASAMY
OGOS	IPD BALING	10	INSP MOHD IZAD BIN MAT HUSIN
OGOS	IPD SPU	8	ASP ZUHAIMI BIN HASSAN
OGOS	IPD KUANTAN	20	ASP SUHAIMI BIN MOHAMAD
SEPT	IPD KOTA BHARU	20	ASP AHMAD ADNAN BIN MOHAMAD
SEPT	IPD KUALA TERENGGANU	20	ASP MUHAMMAD ZAINUDDINBIN AB. GHANI

2

Appendix C: Respondent's information sheet

JAWATANKUASA ETIKA UNIVERSITI UNTUK PENYELIDIKAN MELIBATKAN MANUSIA (JKEUPM)
UNIVERSITI PUTRA MALAYSIA, 43400 UPM SERDANG, SELANGOR, MALAYSIA

BORANG 2.4: PENERANGAN DAN PERSETUJUAN RESPONDEN

Sila baca maklumat berikut dengan teliti. Sekiranya anda mempunyai sebarang pertanyaan, sila kemukakan kepada penyelidik.

1.TAJUK KAJIAN

Faktor psikososial dan penilaian ergonomik untuk membangunkan modul pendidikan ergonomik bagi mencegah gangguan muskuloskeletal (MSD) dalam kalangan polis trafik Malaysia

2. PENGENALAN

Anda dijemput untuk menyertai kajian ini sebagai salah seorang daripada 408 peserta kerana anda berisiko untuk mengalami masalah kesihatan seperti stress dan gangguan muskuloskeletal. Penglibatan peserta dalam kajian ini tidak memerlukan pembayaran. Kajian ini meupakan kajian berunsurkan soal selidik, temu bual dan penilaian untuk melihat hubungan antara faktor psikososial dan ergonomik yang boleh mengakibatkan gangguan muskuloskeletal. Polis trafik yang mengalami gangguan musculoskeletal secara tidak langsung akan menjejaskan prestasi dan produktiviti kerja mereka serta kualiti kehidupan mereka.

3. APAKAH YANG PERLU ANDA LAKUKAN?

Peserta perlu melengkapkan soal selidik yang diberikan sepanjang tempoh kajian ini dijalankan. Terdapat 6 bahagian di dalam kertas soal selidik yang merangkumi Bahagian A (maklumat diri), Bahagian B (maklumat pekerjaan), Bahagian C (maklumat gaya hidup), Bahagian D (musculoskeletal nordic), Bahagian E (o'donnell skor), dan Bahagian F (maklumat stress). Kajian ini mengambil masa kira-kira 15 minit untuk melengkapkan soal selidik yang diberikan. Sila lengkapkan semua enam bahagian dengan memberi jawapan yang paling tepat untuk mendeskripsi diri peserta.

4. SIAPA YANG TIDAK BOLEH MENYERTAI KAJIAN INI?

Mereka yang telah didiagnos mempunyai gangguan muskuloskeletal sebelum bertugas sebagai polis trafik.

5. APAKAH FAEDAH MENYERTAI KAJIAN INI?

a) KEPADA ANDA SEBAGAI PESERTA?

Kajian ini mungkin bermanfaat atau tidak bermanfaat kepada peserta. Peserta boleh mendapatkan data kesihatan dan kualiti kehidupan mereka setelah kajian ini selesai. Kualiti kehidupan peserta and kesihatan mereka akan diutamakan memandangkan prosedur pekerjaan mereka akan dijadikan bersesuaian dengan keupayaan pekerja setelah pihak atasan mengambil maklum akan masalah yang dihadapi oleh polis trafik.

b) KEPADA PENYELIDIK?

Kajian ini memberi manfaat kepada penyelidik. Penyelidik akan mempunyai data semasa yang

relevan untuk membuat kesimpulan tentang faktor psikossosial dan penilaian ergonomic bagi membangunkan modul yang bersesuaian kepada polis trafik. Cadangan yang bersesuaian boleh diberikan kepada pihat atasan yang berkenaan supaya kesihatan dan kualiti kehidupan pekerja dapat ditambah baik.

6. ADAKAH IA BERISIKO?

Tiada risiko yang boleh mengakibatkan kecelakaan kepada peserta dijangkakan sepanjang tempoh penyertaan dalam kajian jini. Hanya risiko yang minima terdapat dalam kajian memandangkan ia tidak invasif.

7. ADAKAH MAKLUMAT DAN IDENTITI SAYA KEKAL RAHSIA?

Penyertaan adalah secara sukarela. Segala maklumat yang diperoleh adalah sulit dan hanya boleh digunakan di dalam kajian ini dan tidak dipublisikan dengan hanya para penyelidik sahaja mempunyai akses data sejajar dengan peraturan dan undang-undang yang berkait. Jika keputusan kajian ini disiarkan kepada umum, identiti peserta tidak akan didedahkan tanpa keizinan. Anda mempunyai hak untuk menarik diri daripada menyertai kajian ini bila-bila masa sahaja tanpa sebarang denda dikenakan.

8. SIAPA YANG SAYA PERLU HUBUNGI SEKIRANYA SAYA MEMPUNYAI SOALAN TAMBAHAN SEMASA MENGIKUTI PENYELIDIKAN INI?

Penyelia : Associate Professor Dr. Karmegam Karuppiah (+60389472513) (megam@upm.edu.my)

Penyelidik (Pelajar) : Nur Zafirah Athirah Binti Zakaria (+60139629277) (nurzafirahathirahzakaria@gmail.com)

Jika anda mempunyai sebarang pertanyaan berkaitan dengan hak-hak anda sebagai peserta dalam penyelidikan ini, sila hubungi: Sekretariat, JKEUPM, melalui email: **jkeupm@upm.edu.my**

Sila tandatangan di sini sekiranya anda telah membaca dan memahami kandungan halaman ini _____

Appendix D: Respondent's consent form

9. PERSETUJUAN

Saya..... No Kad Pengenalan. .....
beralamat.....
.....dengan ini bersetuju untuk mengambil bahagian secara sukarela dalam penyelidikan yang tersebut di atas *(kajian klinikal/percubaan ubat-ubatan/rakaman video/kumpulan sasaran/temuduga/ soal selidik).

Saya telah diberi penjelasan secara menyeluruh mengenai penyelidikan ini dari segi metodologi, risiko dan komplikasi (seperti tertulis pada Helaian Penerangan Responden). Saya memahami bahawa saya berhak menarik diri dari penyelidikan ini pada bila-bila masa tanpa memberi sebarang alasan.Saya juga memahami bahawa sebarang maklumat yang berkaitan identiti saya akan dirahsiakan.

Saya* berminat / tidak berminat untuk mengetahui keputusan kajian yang melibatkan saya.

Saya setuju/tidak bersetuju untuk imei/gambar/rakaman video/ rakaman suara digunakan dalam apa jua bentuk penerbitan atau pembentangan. (sekiranya berkaitan).

*potong yang tidak berkenaan

Tandatangan .....
(*Responden*)

Tarikh :.....

Tandatangan .....
(*Saksi*)

Nama :.....

No. K/P: .....

Saya mengesahkan bahawa saya telah menerangkan kepada responden ini sifat dan tujuan penyelidikan yang tersebut di atas.

Tarikh .....

Tandatangan .....
(*Penyelidik*)

Appendix E: Questionnaire

NO. ID :.....

TARIKH: .....

ARAHAN SOALAN:

1. Borang soal selidik ini mengandungi lapan (8) bahagian iaitu:
   BAHAGIAN A: MAKLUMAT DIRI
   BAHAGIAN B: MAKLUMAT GAYA HIDUP
   BAHAGIAN C: MAKLUMAT PEKERJAAN
   BAHAGIAN D: MENGENAL PASTI HAZARD
   BAHAGIAN E: MAKLUMAT KECEDERAAN
   BAHAGIAN F: MUSKULOSKELETAL (OTOT RANGKA) NORDIC
   BAHAGIAN G: MAKLUMAT STRESS
   BAHAGIAN H: MULTIDIMENSI KELELAHAN
2. Anda diminta untuk menjawab semua soalan yang ada di dalam buku ini
3. Untuk menjawab, sila tandakan jawapan di bahagian jawapan yang telah disediakan
4. Borang soal selidik hendaklah dikembalikan kepada pengkaji setelah selesai menjawab semua soalan

BAHAGIAN A: MAKLUMAT DIRI

				Untuk kegunaan penyelidik
1.1	Tarikh lahir	:	☐☐ ☐☐ ☐☐☐☐	**A 1.1**
1.2	No. Telefon	:	☐☐☐☐☐☐☐☐☐☐	**A 1.2**
1.3	Umur	:	☐☐ tahun	**A 1.3^**
1.4	Jantina	:	☐ Lelaki ☐ Perempuan	**A 1.4***
1.5	Bangsa	:	☐ Melayu ☐ Cina ☐ India ☐ Lain-lain, sila nyatakan _____	**A 1.5^**
1.6	Status	:	☐ Bujang ☐ Berkahwin ☐ Bercerai	**A 1.6**
1.7	Pendidikan	:	☐ PMR/SPM/STPM (Menengah) ☐ Sijil/Diploma ☐ Ijazah/Sarjana/PhD	**A 1.7^**
1.8	Gaji bersih	:	RM ☐☐☐☐☐	**A 1.8**
1.9	Tinggi	:	☐☐☐ cm	**A 1.9**
1.10	Berat	:	☐☐☐ kg	**A 1.10**
1.11	Isi rumah	:	☐☐ orang	**A 1.11**

BAHAGIAN B: MAKLUMAT GAYA HIDUP (*LIFESTYLE*)

2.1 Adakah anda mengambil sebarang jenis ubat-ubatan/ minuman untuk mengekalkan tenaga sepanjang anda bekerja? **B 2.1**

☐ Ya ☐ Tidak

Jika ya, sila nyatakan nama ubat-ubatan/minuman tersebut:

_____

2.2 Kekerapan anda mengambilan ubat-ubatan/minuman di atas semasa menjalankan tugas: _____ kali/sehari **B 2.2**

2.3 Adakah ubat-ubatan tersebut dideskripsi oleh doktor perubatan? **B 2.3**

☐ Ya ☐ Tidak

2.4 Adakah anda merokok? **B 2.4**

☐ Ya ☐ Tidak

Jika ya, _____ batang/sehari

2.5 Adakah anda melakukan sebarang aktiviti fizikal? (bersenam, berjoging, berbasikal) **B 2.5**

☐ Ya ☐ Tidak

Jika ya, nyatakan: _____ dan _____ jam/seminggu

2.6 Berapakah purata jam anda tidur dalam sehari? **B 2.6**

_____ jam/sehari

2.7 Adakah anda mengalami kesukaran untuk tidur? **B 2.7**

☐ Ya ☐ Tidak

2.8 Adakah anda mengalami gangguan ketika tidur? (kerap terjaga ketika tidur, mimpi buruk) **B 2.8**

☐ Ya ☐ Tidak

Jika ya, nyatakan: _____

BAHAGIAN C: MAKLUMAT PEKERJAAN

3.1 Pernahkah anda bekerja di tempat lain sebelum ini? (pekerjaan selain anggota polis) **C 3.1**

☐ Ya ☐ Tidak

Jika ya, sila nyatakan perkerjaan terbabit:

_____

3.2 Apakah pangkat anda sekarang? **C 3.2^**

_____

3.3 Di jabatan mana anda bekerja sekarang? **C 3.3**

_____

3.4 Berapa lamakah anda telah bekerja sebagai polis? **C 3.4^**

_____

3.5 Di balai manakah anda bekerja sekarang? **C 3.5**

_____

3.6 Berapa lamakah anda bekerja di balai polis ini? **C 3.6**

_____

3.7 Apakah tugas seharian anda sebagai anggota polis dalam balai ini? *(boleh nyatakan lebih dari satu)* **C 3.7^**

(a) _____

___

(b) _____

___

(c) _____

___

(d) _____

___

3.8 Shift kerja anda dalam sehari: **C 3.8^**

- ☐ 8 jam/ sehari
- ☐ 16 jam/ sehari
- ☐ 24 jam/ sehari

3.9 Shift kerja: **C 3.9***

- ☐ Shift pagi
- ☐ Shift petang
- ☐ Kedua-dua shift

3.10 Berapakah purata jam anda bekerja dalam sehari? **C 3.10**

_____ jam/sehari

3.11 Berapa jam yang anda perlukan untuk tugasan/aktiviti kerja harian? **C 3.11***

- ☐ 1 – 4 jam
- ☐ 5 – 8 jam
- ☐ 9 – 12 jam
- ☐ Lain-lain _____

3.12 Berapa kerap anda melaksanakan tugasan anda? **C 3.12***

- ☐ Harian
- ☐ Bulanan
- ☐ Tahunan
- ☐ Lain-lain _____

3.13 Berapakah jumlah masa rehat yang diambil semasa melaksanakan tugasan kerja? **C 3.13***

- ☐ 30 minit
- ☐ 60 minit (1 jam)
- ☐ Lebih 1 jam

☐ Lain-lain _____

3.14 Berapa harikah anda bekerja dalam seminggu? **C 3.14**

_____ hari/ minggu

3.15 Adakah anda mengikuti sistem buddy semasa melaksanakan tugasan kerja? **C 3.15***

☐ Ya ☐ Tidak

3.16 Bilangan pekerja yang menjalankan skop kerja yang sama: **C3.16**

_____ orang

3.17 Adakah ruang peribadi disediakan mencukupi? (Contoh: bilik rehat, katil/bilikperibadi) **C 3.17***

☐ Ya ☐ Tidak

3.18 Adakah pengangkutan/ motosikal polis yang digunakan dalam keadaan baik? **C 3.18***

☐ Ya ☐ Tidak

BAHAGIAN D: MENGENAL PASTI HAZAD

5.1 Adakah anda terdedah kepada sebarang hazad seperti di bawah: **E 5.1**

- ☐ Bahan Kimia
- ☐ Habuk
- ☐ Binatang berbisa
- ☐ Mengangkat barangan berat
- ☐ Panas melampau
- ☐ Bunyi bising
- ☐ Gangguan mental dan fizikal
- ☐ Lain-lain, sila nyatakan _____

5.2 Berapa lamakah anda duduk yang berterusan bagi menjalankan tugasan anda? **E 5.2**

_____ jam

5.3 Berapa lamakah anda berdiri yang berterusan bagi menjalankan tugasan anda? **E 5.3**

_____ jam

5.4 Pernahkah anda terlibat dengan kemalangan ketika menjalankan tugasan anda? **E 5.4**

- ☐ Kemalangan kenderaan
- ☐ Rusuhan
- ☐ Tejatuh, tergelincir atau tersadung
- ☐ Letupan
- ☐ Kebakaran

5.5 Pernahkah anda terlibat dengan kemalangan nyaris ketika menjalankan tugasan anda? **E 5.5**

- ☐ Kemalangan kenderaan
- ☐ Rusuhan
- ☐ Tejatuh, tergelincir atau tersadung
- ☐ Letupan
- ☐ Kebakaran

5.6 Berapa kerapkah latihan berkaitan tugasan anda diberikan kepada anda? **E 5.6**

- ☐ Sebulan sekali
- ☐ Enam bulan sekali
- ☐ Lebih setahun sekali
- ☐ Tiga bulan sekali
- ☐ Setahun sekali

5.7 Adakah anda menggunakan sebarang Peralatan Perlindungan Diri (PPE)? **E 5.7**

- ☐ Ya
- ☐ Tidak

5.8 Tandakan jenis PPE yang digunakan: **E 5.8**

- ☐ Kasut keselamatan
- ☐ Topi keselamatan
- ☐ Cermin mata keselamatan
- ☐ Sarung tangan
- ☐ Pakaian perlindungan diri
- ☐ Respirator
- ☐ Lain-lain, sila nyatakan _____

5.9 Berapa lamakah anda menggunakan PPE dalam sehari? **E 5.9**

_____ jam

5.10 Adakah latihan penggunaan PPE diberikan? **E 5.10**

☐ Ya ☐ Tidak

5.11 Adakah anda melakukan penyelenggaraan tetap untuk PPE anda? **E 5.11***

☐ Ya ☐ Tidak

5.12 Apabila saya melaksanakan tugasan saya, saya biasanya akan memusing atau membongkokkan badan secara berterusan. **E. 5.12***

☐ Ya

☐ Tidak

Namakan tugas yang memerlukan anda membuat pergerakan seperti di atas

_____

5.13 Apabila saya melaksanakan tugas saya, saya perlu mengangkat beban berat (25kg dan ke atas). **E. 5.13***

☐ Ya

☐ Tidak

Namakan tugas yang memerlukan anda membuat pergerakan seperti di atas

_____

5.14 Apabila saya melaksanakan tugas saya, saya perlu menggunakan alatan tangan dengan getaran yang tinggi. **E. 5.14***

☐ Ya

☐ Tidak

Namakan tugas yang memerlukan anda membuat pergerakan seperti di atas

_____

5.15 Apabila saya melaksanakan tugas saya, saya perlu kekal dalam gerakan statik/berdiri untuk masa yang lama. **E. 5.15***

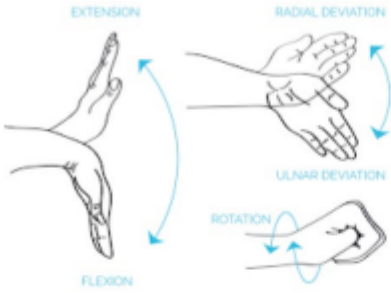
☐ Ya

☐ Tidak

Namakan tugas yang memerlukan anda membuat pergerakan seperti di atas

_____

5.16 Apabila saya melaksanakan tugas saya, lengan dan pergelangan tangan saya berada dalam kedudukan yang janggal. **E. 5.16***



☐ Ya

☐ Tidak

Namakan tugas yang memerlukan anda membuat pergerakan seperti di atas

_____

5.17 Apabila saya melaksanakan tugas saya, saya perlu menggerakkan objek yangberat dengan menolak atau menarik. **E. 5.17***

☐ Ya

☐ Tidak

Namakan tugas yang memerlukan anda membuat pergerakan seperti di atas

_____

5.18 Apabila saya melaksanakan tugas saya, saya terdedah kepada bunyi yang tinggi dan keterlaluan. **E 5.18***

☐ Ya ☐ Tidak

Namakan tugas yang menyebabkan anda terdedah kepada hazard di atas

_____

5.19 Apabila saya menjalankan tugas saya, saya terdedah kepada suhu yang melampau. **E 5.19***

☐ Ya ☐ Tidak

Namakan tugas yang menyebabkan anda terdedah kepada hazard di atas

_____

5.20 Apabila saya melaksanakan tugas saya, saya tidak dapat melihat dengan jelaskerana asap atau kabus. **E 5.20***

☐ Ya ☐ Tidak

Namakan tugas yang menyebabkan anda terdedah kepada hazard di atas

_____

BAHAGIAN E: MAKLUMAT KECEDERAAN *Sila isi jika pernah mengalami kemalangan sewaktu bekerja

6.1 Lokasi kemalangan: **F 6.1**

_____

6.2 Aktiviti yang dilakukan ketika kemalangan berlaku? **F 6.2***

_____

6.3 Punca berlakunya kemalangan: **F 6.3***

- ☐ Tidak sengaja
- ☐ Sengaja mencederakan diri
- ☐ Serangan
- ☐ Tidak dapat dikenalpasti
- ☐ Lain-lain. Sila nyatakan

_____

6.4 Jenis kecederaan: **F 6.4***

- ☐ Tulang patah/ retak
- ☐ Terseliuh
- ☐ Luka kecil dan calar
- ☐ Luka besar dan calar
- ☐ Lebam
- ☐ Gigitan serangga
- ☐ Lecur
- ☐ Lain-lain. Sila nyatakan

_____

- ☐ Tidak pasti

6.5 Mekanisma kecederaan: **F 6.5***

- ☐ Terjatuh
- ☐ Tehantuk objek/ Dipukul individu
- ☐ Api, kebakaran atau haba kebakaran
- ☐ Objek tumpul
- ☐ Pisau/ tertusuk
- ☐ Dipukul individu

- ☐ Serangan binatang
- ☐ Gigitan/ sengatan serangga
- ☐ Lain-lain. Sila nyatakann

_____

6.6 Lokasi kecederan pada anggota badan: **F 6.6**

- ☐ Kepala
- ☐ Leher
- ☐ Abdomen badan
- ☐ Bahagian atas badan
- ☐ Bahagian bawah badan
- ☐ Di pelbagai anggota badan

6.7 Akibat kecederaan: **F 6.7***

- ☐ Kecacatan kekal
- ☐ Kecacatan separa kekal
- ☐ Kecederaan berat

6.8 Adakah anda mengambil cuti akibat daripada kemalangan tersebut: **F 6.8**

- ☐ Ya, nyatakan: _____hari
- ☐ Tidak

6.9 Tahap kecederaan: **F 6.9***

- ☐ Rawatan *'First Aid'* sahaja
- ☐ Kecederaan ringan
- ☐ Kecedeeraan berat

6.10 Kekerapan kecederaan: **F 6.10**

- ☐ Kurang daripada sekali setahun
- ☐ Sekali pada setiap bulan
- ☐ Sekali pada setiap minggu
- ☐ 2-3 kali seminggu
- ☐ Setiap hari

6.11 Adakah anda minum minuman beralkohol dalam tempoh 6 jam sebelum kemalangan? **E 6.11**

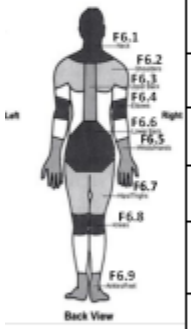
☐ Ya ☐ Tidak

6.12 Adakah anda mengambil sebarang ubatan pada hari kemalangan tersebut? **F 6.12**

☐ Ya, nyatakan: _____

☐ Tidak

BAHAGIAN F: MUSCULOSKELETAL (OTOT RANGKA) NORDIC



	Adakah anda pernah mengalami, sengal, sakit atau tidak selesa pada:	Jika "TIDAK", teruskan untuk bahagian badan yang lain. Jika "YA", sila teruskan	Berapakah umur anda ketika pertama kali masalah tersebut timbul?	Adakah anda pernah dimasukkan ke hospital kerana masalah tersebut?	Adakah anda pernah terpaksa bertukar pekerjaan atau tugas (walaupun sementara) akibat dari masalah tersebut?	Adakah anda mengalami masalah (sengal, sakit, tidak selesa) pada bila-bila masa dalam tempoh 12 bulan yang lepas?	Jika "TIDAK", teruskan untuk bahagian badan yang lain. Jika "YA", sila teruskan	Adakah anda mengalami masalah (sengal, sakit, tidak selesa) pada bila-bila masa dalam bulan lepas? (4 minggu)	Adakah and mengalami masalah (sengal, sakit, tidak selesa) hari ini?	Dalam tempoh 12 bulan yang lepas, pernahkah anda, pada bila-bila masa:			
										Terhalang daripada melakukan tugas-tugas biasa (di rumah atau luar dari rumah) kerana masalah tersebut?	Berjumpa dengan doktor, fisioterapis, kiropraktiker, atau pihak yang berkaitan kerana masalah tersebut?	Mengambil ubat-ubatan kerana masalah tersebut?	Mengambil cuti sakit dari kerja kerana masalah tersebut?
F6.1 LEHER	F6.1(a) ☐ Ya ☐ Tidak		F6.1(b) ____Tahun	F6.1(c) ☐ Ya ☐ Tidak	F6.1(d) ☐ Ya ☐ Tidak	F6.1(e) ☐ Ya ☐ Tidak		F6.1(f) ☐ Ya ☐ Tidak	F6.1(g) ☐ Ya ☐ Tidak	F6.1(h) ☐ Ya ☐ Tidak	F6.1(i) ☐ Ya ☐ Tidak	F6.1(j) ☐ Ya ☐ Tidak	F6.1(k) ☐ Ya ☐ Tidak
F6.2 BAHU	F6.2(a) ☐ Ya ☐ Tidak		F6.2(b) ____Tahun	F6.2(c) ☐ Ya ☐ Tidak	F6.2(d) ☐ Ya ☐ Tidak	F6.2(e) ☐ Ya ☐ Tidak		F6.2(f) ☐ Ya ☐ Tidak	F6.2(g) ☐ Ya ☐ Tidak	F6.2(h) ☐ Ya ☐ Tidak	F6.2(i) ☐ Ya ☐ Tidak	F6.2(j) ☐ Ya ☐ Tidak	F6.2(k) ☐ Ya ☐ Tidak
F6.3 BELAKANG ATAS	F6.3(a) ☐ Ya ☐ Tidak		F6.3(b) ____Tahun	F6.3(c) ☐ Ya ☐ Tidak	F6.3(d) ☐ Ya ☐ Tidak	F6.3(e) ☐ Ya ☐ Tidak		F6.3(f) ☐ Ya ☐ Tidak	F6.3(g) ☐ Ya ☐ Tidak	F6.3(h) ☐ Ya ☐ Tidak	F6.3(i) ☐ Ya ☐ Tidak	F6.3(j) ☐ Ya ☐ Tidak	F6.3(k) ☐ Ya ☐ Tidak
F6.4 SIKU	F6.4(a) ☐ Ya ☐ Tidak		F6.4(b) ____Tahun	F6.4(c) ☐ Ya ☐ Tidak	F6.4(d) ☐ Ya ☐ Tidak	F6.4(e) ☐ Ya ☐ Tidak		F6.4(f) ☐ Ya ☐ Tidak	F6.4(g) ☐ Ya ☐ Tidak	F6.4(h) ☐ Ya ☐ Tidak	F6.4(i) ☐ Ya ☐ Tidak	F6.4(j) ☐ Ya ☐ Tidak	F6.4(k) ☐ Ya ☐ Tidak
F6.5 PERGELANGAN TANGAN/ TANGAN	F6.5(a) ☐ Ya ☐ Tidak		F6.5(b) ____Tahun	F6.5(c) ☐ Ya ☐ Tidak	F6.5(d) ☐ Ya ☐ Tidak	F6.5(e) ☐ Ya ☐ Tidak		F6.5(f) ☐ Ya ☐ Tidak	F6.5(g) ☐ Ya ☐ Tidak	F6.5(h) ☐ Ya ☐ Tidak	F6.5(i) ☐ Ya ☐ Tidak	F6.5(j) ☐ Ya ☐ Tidak	F6.5(k) ☐ Ya ☐ Tidak
F6.6 BELAKANG BAWAH	F6.6(a) ☐ Ya ☐ Tidak		F6.6(b) ____Tahun	F6.6(c) ☐ Ya ☐ Tidak	F6.6(d) ☐ Ya ☐ Tidak	F6.6(e) ☐ Ya ☐ Tidak		F6.6(f) ☐ Ya ☐ Tidak	F6.6(g) ☐ Ya ☐ Tidak	F6.6(h) ☐ Ya ☐ Tidak	F6.6(i) ☐ Ya ☐ Tidak	F6.6(j) ☐ Ya ☐ Tidak	F6.6(k) ☐ Ya ☐ Tidak
F6.7 PINGGANG/ PEHA	F6.7(a) ☐ Ya ☐ Tidak		F6.7(b) ____Tahun	F6.7(c) ☐ Ya ☐ Tidak	F6.7(d) ☐ Ya ☐ Tidak	F6.7(e) ☐ Ya ☐ Tidak		F6.7(f) ☐ Ya ☐ Tidak	F6.7(g) ☐ Ya ☐ Tidak	F6.7(h) ☐ Ya ☐ Tidak	F6.7(i) ☐ Ya ☐ Tidak	F6.7(j) ☐ Ya ☐ Tidak	F6.7(k) ☐ Ya ☐ Tidak
F6.8 LUTUT	F6.8(a) ☐ Ya ☐ Tidak		F6.8(b) ____Tahun	F6.8(c) ☐ Ya ☐ Tidak	F6.8(d) ☐ Ya ☐ Tidak	F6.8(e) ☐ Ya ☐ Tidak		F6.8(f) ☐ Ya ☐ Tidak	F6.8(g) ☐ Ya ☐ Tidak	F6.8(h) ☐ Ya ☐ Tidak	F6.8(i) ☐ Ya ☐ Tidak	F6.8(j) ☐ Ya ☐ Tidak	F6.8(k) ☐ Ya ☐ Tidak
F6.9 PERGELANGAN KAKI/ KAKI	F6.9(a) ☐ Ya ☐ Tidak		F6.9(b) ____Tahun	F6.9(c) ☐ Ya ☐ Tidak	F6.9(d) ☐ Ya ☐ Tidak	F6.9(e) ☐ Ya ☐ Tidak		F6.9(f) ☐ Ya ☐ Tidak	F6.9(g) ☐ Ya ☐ Tidak	F6.9(h) ☐ Ya ☐ Tidak	F6.9(i) ☐ Ya ☐ Tidak	F6.9(j) ☐ Ya ☐ Tidak	F6.9(k) ☐ Ya ☐ Tidak

BAHAGIAN G: MAKLUMAT STRESS

ARAHAN: Di bawah adalah senarai perkara-perkara yang menerangkan aspek-aspek berlainan sebagai seorang pegawai polis. Sila bulatkan jawapan yang menerangkan sebanyak mana setiap perkara tersebut menyebabkan anda stress selama 6 bulan kebelakangan ini.

Langsung tidak stress	Sangat tidak stress	Tidak stress	Sederhana stress	Stress	Sangat Stress	Stress Melampau
1	2	3	4	5	6	7

Bebanan Kerja									
1	Masa kerja syif	1	2	3	4	5	6	7	**H 9.1**
2	Bekerja sendirian lewat malam	1	2	3	4	5	6	7	**H 9.2**
3	Desakan kerja lebih masa	1	2	3	4	5	6	7	**H 9.3**
4	Risiko mendapat kecederaan ketika bekerja	1	2	3	4	5	6	7	**H 9.4**
5	Aktiviti-aktiviti berkaitan kerja di hari yang tidak bekerja (contoh: mahkamah dan acara-acara berkaitan komuniti)	1	2	3	4	5	6	7	**H 9.5**
6	Melakukan kerja-kerja pengkeranian (contoh: laporan)	1	2	3	4	5	6	7	**H 9.6**
7	Kerja-kerja pentadbiran terlalu banyak (contoh pemfailan)	1	2	3	4	5	6	7	**H 9.7**
8	Terlalu banyak kerja-kerja menggunakan komputer	1	2	3	4	5	6	7	**H 9.8**
9	Keletihan (contoh: akibat kerja shif dan kerja lebih masa)	1	2	3	4	5	6	7	**H 9.9**
10	Merasakan seolah-olah ada tekanan supaya anda menawarkan masa lapang anda	1	2	3	4	5	6	7	**H 9.10**
11	Perkongsian tanggungjawab kerja yang tidak sama	1	2	3	4	5	6	7	**H 9.11**
12	Berurusan dengan pihak atasan	1	2	3	4	5	6	7	**H 9.12**
13	Berurusan dengan sistem mahkamah	1	2	3	4	5	6	7	**H 9.13**
14	Berurusan dengan rakan sekerja	1	2	3	4	5	6	7	**H 9.14**
Organisasi									

15	Polisi dan peraturan yang sentiasa berubah-ubah	1	2	3	4	5	6	7	H 9.15
16	Kekurangan kakitangan	1	2	3	4	5	6	7	H 9.16
17	Terlalu banyak birokrasi (contoh: pelbagai peringkat dan proses yang rumit)	1	2	3	4	5	6	7	H 9.17
18	Kurang latihan untuk mengendailkan peralatan-peralatan baru	1	2	3	4	5	6	7	H 9.18
19	Gaya kepimpinan pihak atasan yang tidak konsisten (sentiasa berubah-ubah)	1	2	3	4	5	6	7	H 9.19
20	Kekurangan sumber-sumber (contoh: peralatan informasi)	1	2	3	4	5	6	7	H 9.20
21	Ketua terlalu menekankan perkara-perkara negatif (contoh: penilaian penyelia dan aduan orang awam)	1	2	3	4	5	6	7	H 9.21
Individu									
22	Peristiwa yang memberi trauma (contoh: peristiwa di dalam keluarga atau di rumah, kematian, kecederaan dan melihat kes kemalangan tragik)	1	2	3	4	5	6	7	H 9.22
23	Merasakan anda sentiasa bekerja walaupun di luar waktu kerja	1	2	3	4	5	6	7	H 9.23
24	Merasakan bahawa peraturan-peraturan tertentu hanya untuk orang-orang tertentu sahaja (contoh:pilih kasih)	1	2	3	4	5	6	7	H 9.24
25	Merasakan anda selalu harus membuktikan diri anda kepada organisasi	1	2	3	4	5	6	7	H 9.25
26	Keperluan untuk bertanggungjawab dalam melakukan kerja anda	1	2	3	4	5	6	7	H 9.26
27	Isu-isu kesihatan berkaitan kerja (contoh:sakit belakang, leher, sakit sendi)	1	2	3	4	5	6	7	H 9.27
28	Sekiranya anda sakit atau cedera rakan sekerja anda seolah-olah memandang rendah pada anda	1	2	3	4	5	6	7	H 9.28
29	Makan secara seimbang semasa bekerja (contoh: tidak makan makanan segera)	1	2	3	4	5	6	7	H 9.29
30	Mencari masa untuk mengekalkan keadaan fizikal yang baik (contoh: bersenam)	1	2	3	4	5	6	7	H 9.30

Sosial									
31	Menguruskan aktiviti sosial anda di luar tempat kerja	1	2	3	4	5	6	7	**H 9.31**
32	Tidak cukup masa untuk diluangkan bersama rakan dan keluarga	1	2	3	4	5	6	7	**H 9.32**
33	Keluarga dan rakan-rakan kurang memahami berkenaan dengan kerja anda	1	2	3	4	5	6	7	**H 9.33**
34	Berkawan dengan rakan-rakan selain tempat kerja	1	2	3	4	5	6	7	**H 9.34**
35	Membawa imej yang tinggi kepada orang awam	1	2	3	4	5	6	7	**H 9.35**
36	Komen-komen negatif dari orang awam	1	2	3	4	5	6	7	**H 9.36**
37	Limitasi (sekatan) kepada kehidupan sosial anda	1	2	3	4	5	6	7	**H 9.37**
38	Rakan/keluarga merasakan kesan daripada pandangan serong orang ramai berkaitan dengan pekerjaan anda	1	2	3	4	5	6	7	**H 9.38**

BAHAGIAN H: MULTIDIMENSI KELELAHAN

ARAHAN: Dengan pernyataan berikut, kami ingin mendapatkan idea bagaimana perasaan anda akhir - akhir ini. Sila bulatkan jawapan yang menerangkan sebanyak mana setiap perkara tersebut menggambarkan diri anda.

Sangat setuju	Setuju	Neutral	Tidak setuju	Sangat tidak setuju
1	2	3	4	5

1	Saya berasa cergas	1	2	3	4	5	I 10.1
2	Secara fizikal, saya rasa dapat melakukan banyak aktiviti	1	2	3	4	5	I 10.2
3	Saya berasa sangat aktif	1	2	3	4	5	I 10.3
4	Saya rasa seperti melakukan pelbagai perkara yang baik	1	2	3	4	5	I 10.4
5	Saya berasa bertenaga	1	2	3	4	5	I 10.5
6	Saya fikir saya melakukan banyak perkara dalam sehari	1	2	3	4	5	I 10.6
7	Apabila saya melakukan sesuatu, saya boleh menyimpan fikiran saya mengenainya	1	2	3	4	5	I 10.7
8	Secara fizikal saya boleh melalui banyak perkara	1	2	3	4	5	I 10.8
9	Saya berani perlu melakukan sesuatu	1	2	3	4	5	I 10.9
10	Saya fikir saya melakukan sedikit dalam sehari	1	2	3	4	5	I 10.10
11	Saya boleh menumpukan perhatian dengan baik	1	2	3	4	5	I 10.11
12	Saya cukup rehat	1	2	3	4	5	I 10.12
13	Ia memerlukan banyak usaha untuk menumpukan perhatian kepada perkara-perkara	1	2	3	4	5	I 10.13
14	Secara fizikal saya rasa saya berada dalam keadaan sangat baik	1	2	3	4	5	I 10.14
15	Saya mempunyai banyak rancangan	1	2	3	4	5	I 10.15
16	Saya tidak mudah penat	1	2	3	4	5	I 10.16
17	Saya dapat selesaikan banyak perkara	1	2	3	4	5	I 10.17
18	Saya sentiasa mahu melakukan sesuatu	1	2	3	4	5	I 10.18
19	Fikiran saya sentiasa fokus	1	2	3	4	5	I 10.19
20	Secara fizikal saya rasa saya berada dalam keadaan yang sangat baik	1	2	3	4	5	I 10.20

BIODATA OF STUDENT

The author of this thesis, Nur Zafirah Athirah binti Zakaria, was born on January 6, 1999, in Kuala Lipis, Pahang. She completed her primary education at SK Badak, Bachok, from 2006 to 2011. Subsequently, she pursued her secondary education at Maahad Amir Indera Petra from 2012 to 2016, specializing in the science stream with 11 subjects registered for the Sijil Pelajaran Malaysia (SPM) examination. In 2017, she was admitted to Universiti Putra Malaysia (UPM) as a student of Foundation Studies (ASPer). She then continued her academic journey by enrolling in the Bachelor of Environmental Health program and successfully graduated in 2022. Currently, she is pursuing a Master of Science degree in Occupational Health.

LIST OF PUBLICATION

Published

Zakaria, N. Z. A., Karuppiah, K., Mohammad Yusof, N. A. D., Mohamad Jamil, P. A. S., Rasdi, I., Tamrin, S. B. M., ... & Naeni, H. S. (2023). Protecting Those Who Protect Us: A Review of Psychosocial Factors and Musculoskeletal Disorders in Police Officers. *Malaysian Journal of Medicine & Health Sciences*, *19*. https://doi.org/10.47836/mjmhs.19.s14.13